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Wartime Maintenance of  
Vermont's Highways  
Laying a Sewer Through  
a Swamp  
Repairing Slow Sand  
Filters of Lawrence

# Public Works

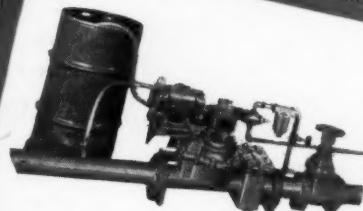
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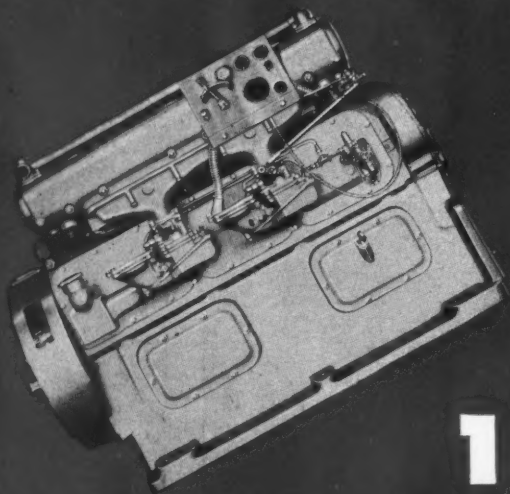
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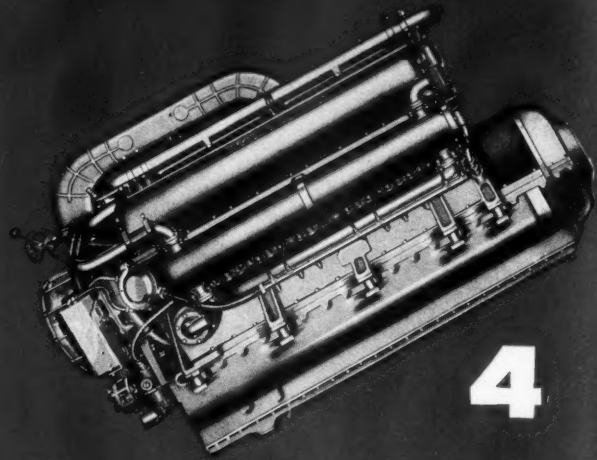


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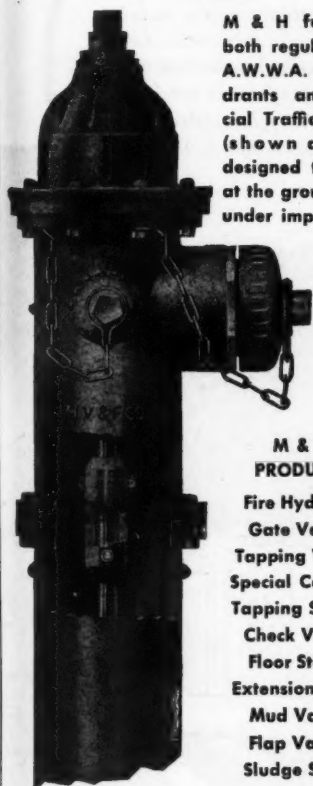


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Founded in 1896

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Vol. 76 No. 4

A. PRESCOTT FOLWELL, Editor

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## WHEN "BIG BOY" TAKES OFF HIS UNIFORM



● All over the world, where the going is toughest, the M1A1 Army heavy wrecker has earned its reputation as the biggest, toughest, pullin'-est bruiser on wheels. These super trucks, built by Ward LaFrance Truck Division for the Ordnance Department, are used for such jobs as tank recovery, motor vehicle rescue, lifting and carrying disabled bombers. They operate in the mire of European swamps . . . the muck

of Asiatic jungles. To the M1A1 wrecker, a road is a convenience, rather than a necessity . . . In the near future, Ward LaFrance commercial trucks and tractors will again appear on America's highways. These Ward LaFrance over-the-road trucks and tractors are designed to haul pay loads faster and more economically than ever before. They are not streamlined like a sport coupe, but they look like what they are: the biggest, toughest, sturdiest motor trucks on the highway. They are backed by the twenty-five year Ward LaFrance reputation for building great trucks, further proved by unbeatable performance all over the world.

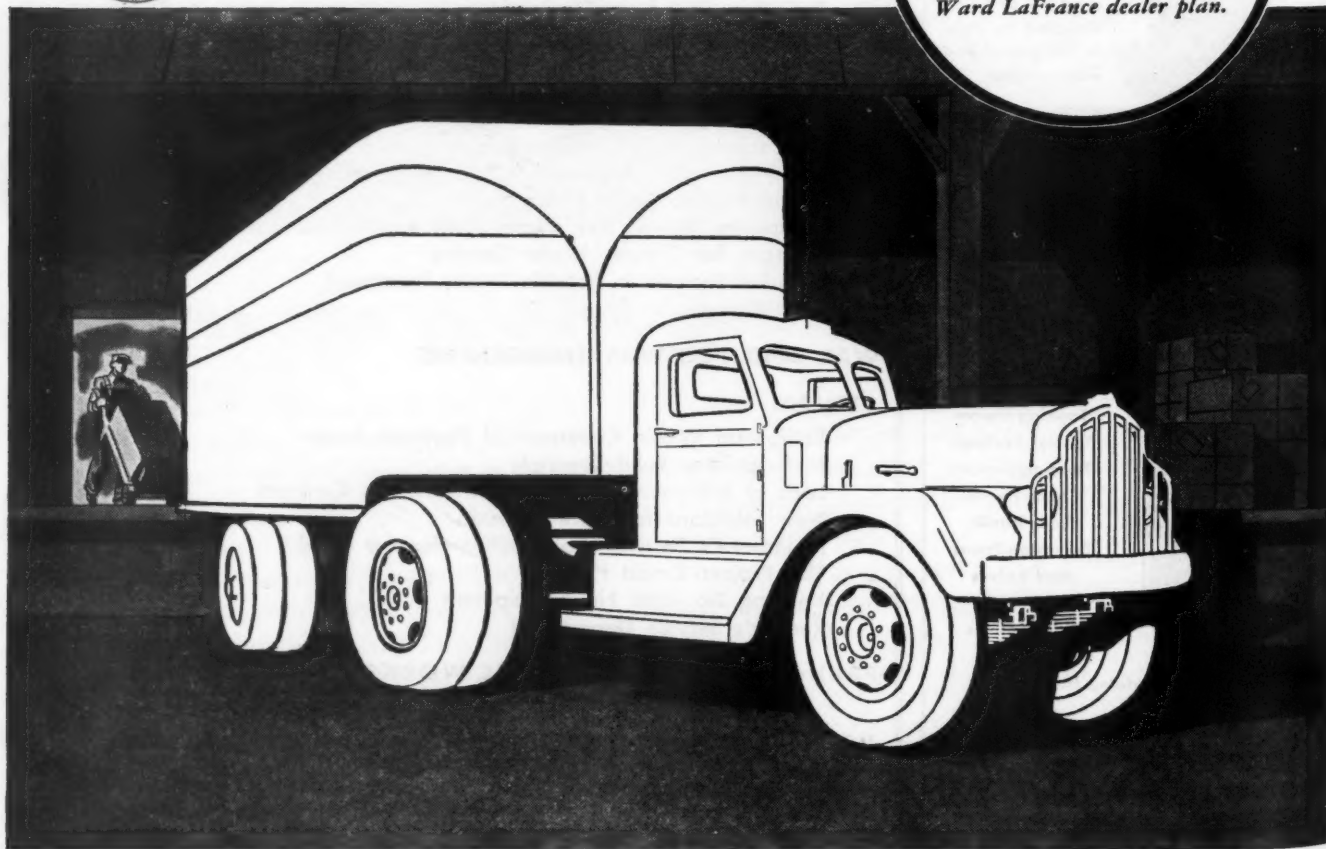
# WARD LAFRANCE

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# WAR and POSTWAR EMERGENCIES



## Shortages in Building Materials

WPB has recently reported as follows concerning availability of materials used in public work: Lumber—extremely tight; situation probably will get worse before improving.

Plywood—softwood plywood is very scarce.

Steel—tighter than at any time for two years past. Deliveries of galvanized steel not probable before the end of the year. Reinforcing bars obtainable, but more difficult to obtain than three or four months ago. Prospect for reinforcing mesh improved.

Brick. Ample supply of all kinds.

Clay pipe and tile. Abundant throughout the country.

Asphalt. Good supply for road work, except in some localities due to transportation difficulties. No restrictions except against its use for road oil and dust palliatives in certain far western states.

Portland cement. Available in all sections of the country.

Concrete pipe, plain and reinforced, available in most sections.

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## Withdrawals of Emergency Specifications for Cement

With the withdrawal on November 25 of the General Limitation Order L-179 covering the manufacture of cement the need for the A.S.T.M. Emergency Alternate Specifications for Portland Cement (EA - C 150) no longer existed and they have been withdrawn. These emergency requirements were in line with the former WPB order which limited manufacture to three types of cement. This order was originally issued in August, 1942, when demands for portland cement were very high, the total production for that year being the highest on record—135,000,000 barrels.

## Federal Aid for Airports

The Chamber of Commerce of the United States is actively supporting a federal-aid airport system by which the granting of federal funds would be restricted to grading, construction of runways, lighting and other safety features and matching of federal funds by at least equal amounts of state and local money for the same purposes.

Another requisite would be that the state or local jurisdictions provide land, buildings and maintenance. One main reason for this is the belief that the total of state or local funds expended on any particular airport, or on the airports of any particular state, should be much greater than the federal contribution.

Federal-aid highway appropriations generally have been from 15 to 20 per cent of the total construction costs for streets and highways, and this moderate federal participation has proved sufficient to obtain the needed stimulation and coordination. The Cham-

ber believes it is reasonable that, in the case of airports also, a much less proportion than 50 per cent of the total expenditure will be sufficient to accomplish the same objectives.

## Give Veterans 90 Days to Return

Federal employees in the military service have 90 days after their release, under a recent amendment to the National Selective Service and Training Act, to apply for reinstatement to their former jobs, as compared to the 40-day limit previously set. State and local governments have almost invariably adopted military leave policies patterned after the federal act and some municipalities have already put the 90-day time limit in effect.

## War Memorials

The postwar plans of quite a number of cities include "war memorials," which take a variety of forms. But instead of statues, shafts, arches, etc., many of them are choosing structures or other objects which will be of service to the community. Recreation buildings are planned by Mobile, Alabama; Pasadena, California; Jackson, Mississippi; Oregon City, Oregon; Chester and Newberry, South Carolina; West Bend, Wisconsin; Monroe, Michigan; and Winchester, Virginia. Greenville, South Carolina (34,734) is planning a sports' center memorial to include a swimming pool, tennis courts, baseball diamonds, and other facilities. In Oglesby, Illinois (3,938) a poll on a suitable war memorial gave first place to a new hospital, a city hall and auditorium second, and an outdoor swimming pool third place. Cities planning to build municipal auditoriums as war memorials include Fort Dodge, Iowa; Greensboro, North Carolina; Griffin, Georgia; and Modesto and San Diego, California. Quincy, Massachusetts will build a memorial city hall; Medford, Massachusetts, a memorial public library; Arkansas City, Kansas, and St. Joseph, Michigan, memorial hospitals, and Jacksonville, Illinois, a community building. Nebraska City, Nebraska (7,339), the home of J. Sterling Morton, founder of Arbor Day, will plant individual trees for servicemen.

## Paint for Highway Guide Lines Scarce

The Minnesota Department of Highways reports difficulty in obtaining white and yellow paint for its highways. The state uses yellow paint for indicating "no passing" zones and white and black paint, on black and concrete pavements respectively, for center lines. Bids for paint were asked for on Feb. 16, but none were received for either yellow or white. New bids were asked for March 23, with provision for bids on small quantities, but again no bids. Bids for about half of a normal season's supply of black paint were received. In 1944 the Department used 5,600 gal. of black paint, 6,400 gal. of white and 8,700 gal. of yellow, applied to 6,194 miles of stripes.

# SIMPLEX

**INCREASE FLOW CAPACITY 40% TO 60%**

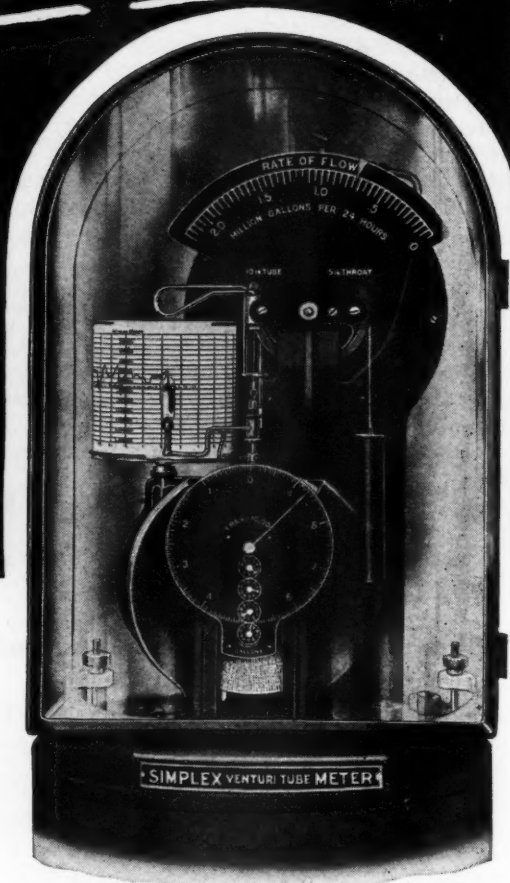
## MOL or MOLA METERS

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Two typical examples of the ease and economy of increasing the maximum capacity of flow lines with the use of Simplex MOL and MOLA wide-range meters are given below:

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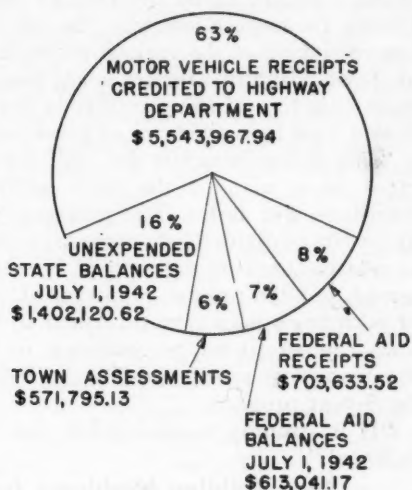
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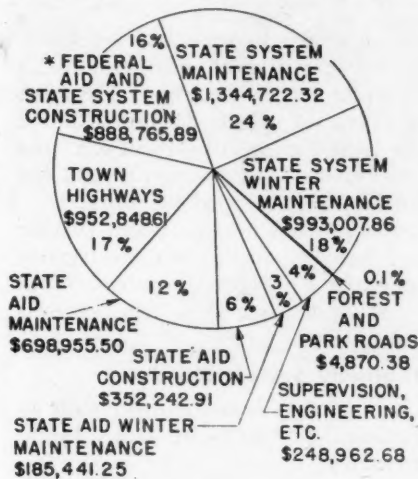
## Where The State Money Came From For Highway Work

Highway Receipts During Biennial Period July 1, 1942, to June 30, 1944, and Unexpended Balances as of July 1, 1942



## Where The State Money For Highways Was Spent

During the Biennial Period July 1, 1942, to June 30, 1944



Highway receipts and expenditures during the biennial period.

## Wartime Maintenance of Vermont's Highways

**Summer maintenance reduced during the war, but not winter maintenance. Needs of town, state aid and state highways. Effect of the war on traffic. Road building machinery desired.**

THE biennial report of the State Highway Board of Vermont for the two years ending June 30, 1944, is an unusually commendable one for a small state; giving the pertinent information without overloading it with unnecessary details, in an easily understood form attractively illustrated with photographs and diagrams. And the work described seems to indicate the use of excellent judgment in spending a moderate revenue to the best advantage. Quotations and abstracts of parts of this report follow.

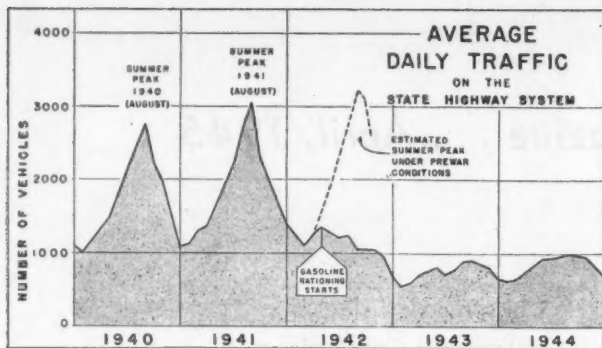
The highways are classified as State Highway System (1,781 miles); State Aid Highway System (2,732 miles); and Town Highway System (9,727 miles). Of these 14,240 miles, 404 are surfaced with concrete, 11 with bituminous surface on concrete, 10 with plant-mix macadam, 117 with penetration macadam, 172 with mixed-in-place macadam, 542 with bituminous mix; 907 with surface-treated gravel; 6,173 are gravel; 3,901 are graded and drained only; 1,199 are un-

improved; and 799 are primitive. There are about 3 miles of short stretches of brick, granite block, rock asphalt and soil cement.

"Maintenance expenditures for State Highways were reduced 20 per cent during the biennium. Because of this, all necessary work could not and cannot be done, but the really vital repairs have been kept in hand. To a large extent, manpower and equipment shortages, rather than available funds, were primary factors in curtailing maintenance operations on the State System. Winter maintenance, however, was generally up to prewar standards. Summer maintenance gave priority to keeping pavements in good condition, since these were subject to the most expensive loss if permitted to deteriorate. Deferred maintenance on other items, such as bridge painting, guard rails, culverts and roadsides, is increasing but can be caught up without undue loss as soon as labor becomes available."

Most of the Highway Department's engineers are





Average daily traffic on State highways, 1940-1944.

in the armed forces or war industries, but the supervisory staff and a few experienced men remain. A postwar program is under way consisting of 118 miles of road and 29 bridges, of which 21 miles and 2 bridges had already been approved by the PRA, and plans for 49 miles of Federal Aid paving projects had been prepared before the war stopped the work.

In 1940 the department drew up a proposed 10-year construction program based upon the relative urgency of existing deficiencies in the highway system. Work started on this in 1941, but after Pearl Harbor, was suspended for the duration.

#### Town Highway System Needs

"In order to provide every Vermont farm with an improved gravel outlet, 2,800 miles of Town Highways must be constructed.

"This work will cost an estimated \$7,500,000. On a basis of prewar (1941) state and town appropriations, 60 percent of the towns in the state can accomplish this work within a 10-year period; 33 percent of the towns within a 20-year period; 6 percent of the towns within a 30-year period; and 1 percent of the towns within a 40-year period."

#### State Aid Highway System Needs

"In order to bring the State Aid Highways up to standards that will provide adequate service to those who use them, it will be necessary to improve 1,398 miles of road and build 182 bridges. This work will cost an estimated \$9,518,820."

Highways in the State Aid System have been classified as follows:

Class 1. Inter-County Highways and Highways Connecting the Larger Villages. Average daily traffic volume: 200 to 500 vehicles. Standards: 18-foot bituminous surface on a 24-foot roadway; minimum curvature 20 degrees where economically practical.

Class 2. Inter-Town Highways and Highways Connecting the Smaller Villages. Average daily traffic volume: 100 to 199 vehicles. Standards: 18-foot gravel chloride or bituminous surface on a 24-foot roadway; minimum curvature 30 degrees where economically practical.

Class 3. Inter-Town and Land Service Highways. Average daily traffic volume: 40 to 99 vehicles. Standards: 16-foot gravel surface on a 20-foot roadway.

Class 4. Land Service Highways. Average daily traffic volume: 0 to 39 vehicles. Standards: 14-foot gravel surface on an 18-foot roadway.

Bridges. The replacement of all bridges having a capacity of less than 15 tons is considered for Classes 1, 2 and 3 highways; less than 10 tons for Class 4 highways. All new bridges would have a 24-foot roadway."

#### State Highway System Needs

"In order to provide safe and adequate State Highways for present and future traffic, it will be necessary to improve 1044 miles of our 1780-mile State System, reconstruct 255 bridges, eliminate 28 railroad grade

crossings, and reconstruct or eliminate 20 railroad overpasses and underpasses.

"This work will cost an estimated \$40,545,500. On the basis of estimated available revenue after the war, it will take approximately 19 years to complete this work."

The accompanying graph shows the variations of motor vehicle traffic of Vermont's highways during the prewar years of 1940 and 1941 and the three following war years. In 1942, traffic had started its spring climb when gasoline rationing cut it short. The dotted line shows the summer peak that would normally have developed.

#### Five-Year Program for Town Highways

"As a result of the survey of Town Highway needs recently completed by the District Highway Commissioners in cooperation with the selectmen and road commissioners of the various towns, a 5-year program of Town Highway improvement was drawn up. The main objective of the program is toward providing a gravel road to every farm on the Town System.

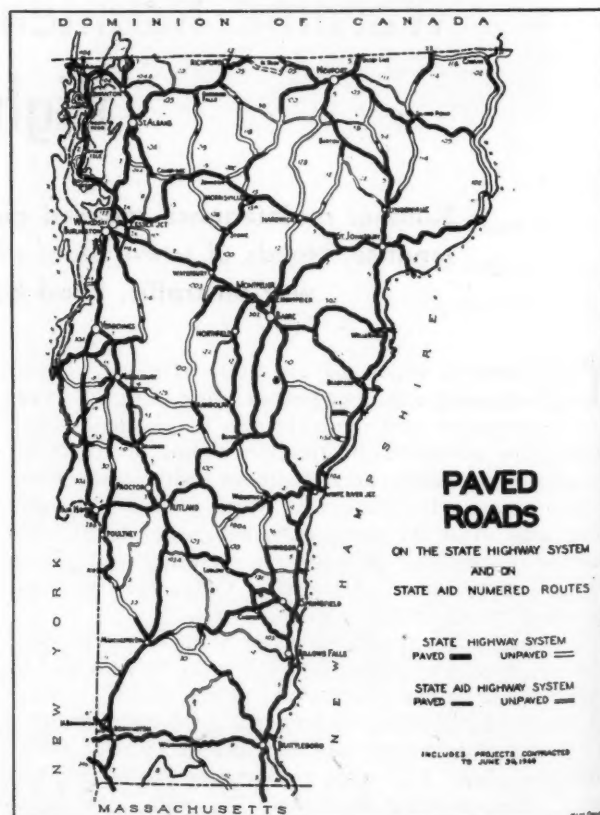
"The 5-year program for each town has been indicated on a map of the town which shows all the dwellings and farms. The proposed work to be done in 5 years is divided into projects, numbered according to relative need as determined by the farms actually served and the present condition of the road. A copy of each town map was furnished to the selectmen of town can afford not to make use of such equipment. The respective towns which were interested, showing the 5-year program.

"It is strongly recommended that this program be followed."

#### Road Building Machinery for Towns

"Highway work, both construction and maintenance, can be done cheaper, quicker and more efficiently by the use of road building machinery. Such machinery

(Continued on page 36)



Paved roads on Vermont's State and State Aid highway systems.

# Hazards in Sewage Works Operation

**Found to be much greater than in machine shops, chiefly because of explosive and noxious gases and oxygen deficiency. Precautions which should be taken to eliminate them and remedies to be applied.**

**T**HE Federation of Sewage Works Associations has just issued a 50-page manual entitled "Occupational Hazards in the Operation of Sewage Works," being the first of a series which it proposes to prepare on "subjects of specific interest and value." First discussing the nature of such hazards and their relative frequency, it describes in detail how they can be prevented or at least minimized, and what to do when they occur. In the following article we give a brief abstract of the manual, with special emphasis on the importance of the subject to all operators of sewage plants and sewer systems.

The committee assembled reports of 44 accidents that have occurred in sewage works. Five of these were explosions in digestion tanks, 8 in other parts of a treatment plant, and 9 in pumping stations. Seventeen were explosions in sewers. Oxygen deficiency in sewers, tanks, etc., caused several deaths. And this list is known to be incomplete. Figures furnished by insurance companies, taking for comparison machine shops (which are considered by such companies as "standard classification"), the death rate per million dollars of payroll was 215% greater for sewage disposal plants during the period 1934-1938, and the insurance rates are 7.5% greater in New Jersey, 36% greater in Connecticut, 47.5% in New York and 62.5% in Pennsylvania.

The hazards include exposure to physical injuries, body infections, noxious gases and vapors, and oxygen deficiency. They can be eliminated or greatly minimized by: 1—Proper design of sewers, sewage pumping stations and treatment plants; 2—Use of safety equipment; and 3—Efficient administration and the execution of safe practices.

## Physical Injuries

Taking first the prevention of physical injuries, the suggestions offered include making manhole steps of corrosion-resistant material 9" or more wide placed 12" to 15" apart, vertically aligned rather than staggered, the ladder side of the manhole shaft being built as nearly vertical as possible. Men working in deep sewers should wear safety belts and at least two men should be at hand for lifting them up the manhole shaft in case of accident.

Danger spots in treatment plants should be protected by fencing, chains, railings or guards, although in some cases these may increase the hazard, as at the ends of tanks where skimming operations are performed, or along Imhoff tank flow-chamber passageways used for squeegeeing. In sewage plants and pumping stations, stairs are much preferable to ladders; where the latter are used, a hoop-cage enclosure may save many falls.

Fire extinguishers should be distributed about the plant; carbon tetrachloride or carbon dioxide extinguishers near electrical equipment.



M. S. A. all-service gas mask.

Walkways around Imhoff tanks should be at least 15" wide; the width may be increased by creosoted wooden planks laid parallel to the walkway.

## Body Infections

Considering the matter of body infections, insurance figures indicate that about 250,000 cases of infected wounds develop every year in the United States, accounting for 40% to 60% of the compensation insurance paid; and lost time for a case of infection averages 18 weeks longer in disability than for a non-infected case. Equipment suggested for preventing infection includes rubber gloves, to be worn while cleaning sludge pumps, handling screenings, sewage, grit or other filth, especially when the hands are chapped, burned or the skin broken. First-aid kits should be used for all injuries, no matter how unimportant they may seem, every cut or scratch being cleaned and a 2% tincture of iodine solution being applied.

## Gases and Vapors and Oxygen Deficiency

The largest part of the manual is devoted to the prevention of the dangers from gases and vapors and oxygen deficiency. Explosions in public sewers have been experienced in almost every large city in both America and Europe. Los Angeles, Calif., is one of the few cities that take measures to prevent them, employing an explosive-gas survey crew which tests the atmosphere in about 60,000 manholes a year.





The M. S. A. safety belt.

In the operation of sewage works, the greatest hazard from noxious gases and vapors, and oxygen deficiency, will be found:

(1) In deep sewer manholes, especially those over large sewers or sewers serving industrial areas.

(2) In enclosed sewage screening or comminutor rooms where outfall sewers discharge.

(3) In covered tanks where organic matter is decomposing, such as separate sludge digestion tanks, septic tanks, sludge storage tanks, sludge conditioning tanks, or sewage screenings bins.

(4) In digestion tank galleries or rooms where sludge gas piping, gas boilers, and gas appurtenances are located.

(5) In sludge gas storage tanks.

(6) In sludge pump rooms located below grade.

(7) In underground structures, such as abandoned cisterns, storm sewers, sewer regulator chambers, covered empty tanks of all descriptions, pipe galleries, or check valve pits, where an oxygen deficiency may occur.

(8) In sewers on the upstream side of Venturi meters, or in sewers above the point at which the full area of the sewer has been occupied by sewage.

#### Design of Sewage Pumping Stations and Treatment Plants

The units requiring particular attention for the safe design of sewage pumping stations and treatment plants for protection against gas hazards are:

(1) Sewer discharges, such as in screen or comminutor rooms, and sewage receiving wells, where enclosures are provided.

(2) Sludge pumping facilities.

(3) Sludge digestion tanks.

(4) Sludge gas collection and utilization facilities.

(5) Chlorine handling facilities.

Natural ventilation through windows and doorways should always be provided. In many cases ventilating stacks or mechanical exhaust systems are desirable. Sewage receiving wells at pumping stations should be entirely separated from pump and motor rooms. Several deaths have occurred in sludge pumping rooms when pumps were being dismantled for cleaning.

The greatest care should be taken to eliminate hazards in the sludge gas collection and utilization facilities. Attention is called to the fact that designers generally have provided too few condensate traps. Several firms specialize in furnishing flame checks, regulating and relief valves and other safety devices for the use of gas. Designing engineers should provide detailed drawings of the gas layout, including the location of the gas safety devices. And all gas piping should be checked regularly for leaks. A state health department recently checked all such systems in the state and found one or more gas leaks in over 80% of the plants, although no odor was noticeable.

#### Safety Equipment

Safety equipment available for use by sewage workers includes that for detection of gases (hydrogen sulphide, methane, carbon monoxide and others) and oxygen deficiency; gas masks, oxygen breathing apparatus, hose masks; portable lighting equipment, non-sparking tools, portable blowers, inhalators, safety belts, warning signs, electric explosion-proof lanterns.

The total cost of the gas-testing equipment recommended is about \$100. The cost of a portable air blower, lantern, safety belt, hose mask and chlorine mask is about \$300—an insignificant cost for insurance against the loss of even a single life.

#### Partial List of Manufacturers of Safety Equipment

*General Safety Equipment* (Gas Testing Devices, Masks, Safety Belts, Vapor-Proof Electric Lights, etc.)

1. Mine Safety Appliances Co., Pittsburgh, Pennsylvania.

2. Davis Emergency Equipment Co., Inc., New York City.

3. Pulmosan Safety Equipment Corp., 176 Johnson Street, Brooklyn, New York.

4. Kohler Manufacturing Company, Marlboro, Mass.

5. Portable Lamp and Equipment Co., Pittsburgh, Pa.

6. E. D. Bullard Company, San Francisco, California.

7. B. F. McDonald Safety Supply Co., Los Angeles, California.

*Portable Non-Sparking Manhole and Tank Ventilators*

1. Home-Lite Corp., Portchester, N. Y.

2. Mine Safety Appliances Co., Pittsburgh, Pennsylvania.

3. Coppel Engineering Corp., 344 Park Ave., Worcester, Mass.

*Approved Flame Traps, Relief Valves, Pressure Regulators, Condensate Traps, etc., for Sludge Digestion Tank Gas*

1. Pacific-Flush Tank Co., 441 Lexington Ave., New York City.

2. Vapor Recovery Systems Co., 2820 N. Alameda St., Compton, California.

*Non-Sparking Safety Tools*

Ampco Metal, Inc., 3830 W. Burnham St., Milwaukee, Wis.

*Explosion-Proof Lighting Fixtures and Wiring*

Crouse-Hinds Co., Syracuse, N. Y.

*Explosion-Proof Electric Switches and Motors*

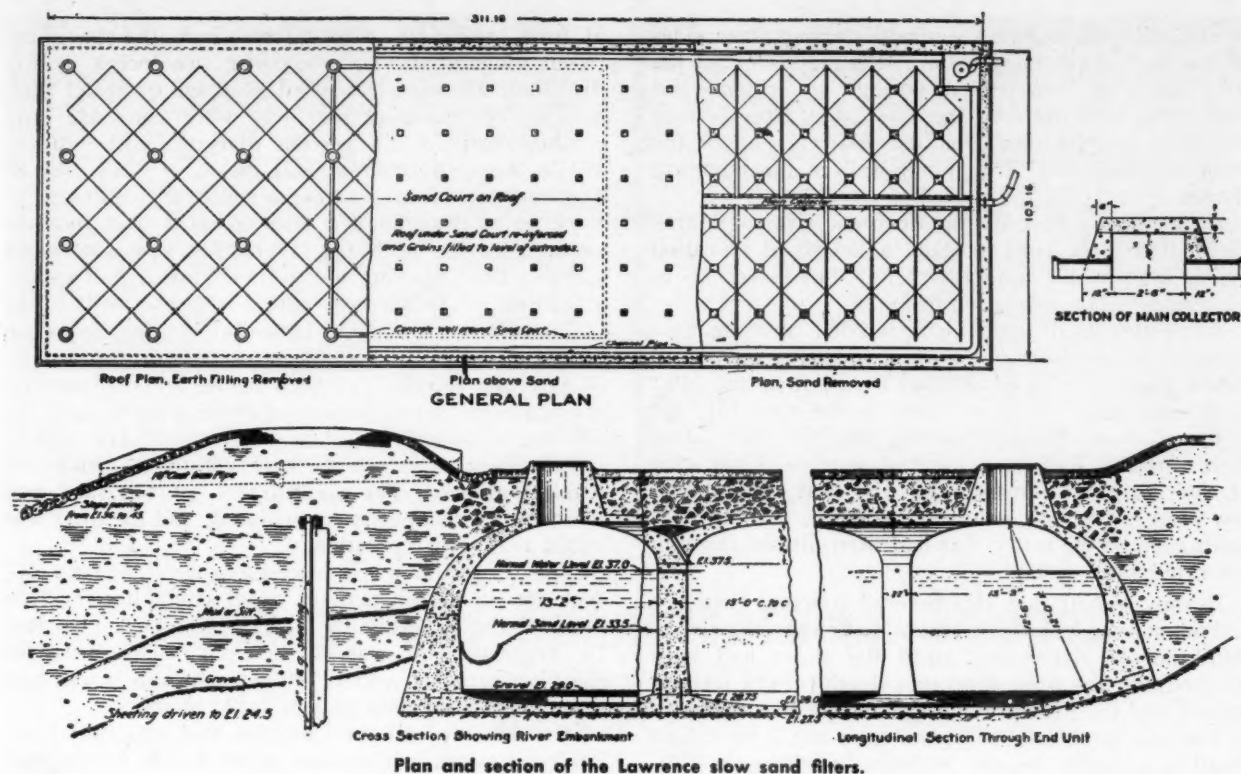
General Electric Co., Schenectady, N. Y.

(Continued on page 52)



M. S. A. hydrogen sulphide detector.





Plan and section of the Lawrence slow sand filters.

## Repairing Slow Sand Filter of Lawrence, Massachusetts

River water originally was flowed directly onto the filter, and sand and drain pipe were badly clogged. Also leaks were found in the floor and construction joints. How these defects were repaired is described.

By **FRANK A. BLACKSTOCK**  
City Engineer, Lawrence, Mass.

THE City of Lawrence, Mass., uses the Merrimack river as its source of supply, and as the stream is highly polluted, due to the discharge of sewage and manufacturing wastes from several cities upstream, it is necessary that the water be filtered before public consumption. Therefore in 1907, slow sand filters were built directly on the bank of the river, so that raw water could enter upon them by gravity flow.

The city has recently made extensive repairs to one of these filters which is used in conjunction with a rapid sand filtration system which was constructed in 1937 for the municipal water supply.

This slow sand covered filter has an area of 0.73 acre, the inside dimensions being 311 feet long by 103 feet wide. The filter was designed to purify about 1½ million gallons per day, or to filter water at the rate of 2 million gallons per acre per day.

It is built entirely of concrete, with a cover of the groined arch type of construction and a bottom designed as a series of inverted arches. The filter is built in bays, each bay being 15 feet center to center of piers, with various manholes in the roof for the pur-

pose of letting light into the filter and also to serve as ventilators. Storage room for sand is provided upon the roof, an area of 6 bays each way in the middle of the filter being strengthened and utilized for this purpose. An earth fill covers the remainder of the structure to a depth of 3 feet; the top being at the general elevation of the surrounding ground, the filter is not noticeable except for the manhole covers and the entrance to the filter.

Underdrains of vitrified pipe with open joints, laid in the bottom of each inverted floor arch, discharge into a main collector of concrete which runs longitudinally through the filter. The underdrain pipes are surrounded by layers of gravel, 12 inches in depth, grading from 3 inches in diameter to ¾ of an inch or smaller and then into coarse sand. The filter sand is about 4½ feet deep and has an effective size ranging from 0.22 millimeter to 0.28 millimeter.

The normal sand surface is at elevation 33.50, while the normal water level is at elevation 37.50. Originally the raw water from the river was distributed from an inlet chamber at one corner of the filter by means

of channel pipe running entirely around three sides of the filter. Now the distribution is the same, but the river water is first passed through the rapid sand filter. The effluent from the slow sand filter is conveyed by gravity flow from the easterly end of the main collector to a large pump-well in the pumping station.

In the spring flood of the Merrimac river of March 19-21, 1936, the river reached a height of elevation 49.75, high water normally being 11.75 feet above the average water elevation of 30.25.

After the flood waters had receded and the area occupied by the filters been pumped out, it was found that a heavy deposit of silt had been left on the filter sand and had also filtered through the sand into the pipe collectors, thereby so clogging the filters that their capacity had been lowered nearly 50 per cent of their original functioning. Also that ground and raw river water was entering the filter, causing contamination of the water that had been filtered through the rapid sand system.

It was evident that this covered concrete structure had numerous leaks, but where and what they were could not be determined until the water had been pumped out, the filter sand to a depth of 4½ feet removed, and the gravel to a depth of one foot removed. It was also problematical whether or not it would be possible to make repairs without installing a well-point system. But work was started by using an 8-inch electric pump, and when the water was pumped off a sump pit was dug through the sand and gravel to the concrete floor, and except for a few occasions when an additional 3-inch gasoline pump was used, the 8-inch pump kept the water down so that repairs could be made.

The volume of sand and gravel removed was 6050 cubic yards. This was done by breaking a hole in the concrete roof near the center of the filter, through which a bucket from a crane could be lowered. The material was shoveled into barrows and wheeled to this point. The sand and gravel was trucked to a storage pile, where it was washed through hoppers with city water pressure, removing the fines. It was found by mechanical analysis that most of the sand could be returned to the filter after repairs had been made.

Upon inspection it was found that, outside of a few places in the walls that were porous, most of the infiltration was through opened construction joints in the river wall and the one opposite, in the construction joint between the walls and the floor, through the floor around the piers, and through cracks in the inverted floor arches.

All construction joints and floor cracks were chipped out with chisels to a depth of 2 inches and a surface width of 1 inch, forming a V-shaped channel section. This was cleaned and moistened with water before filling. Raw Portland cement was mixed with waterproof compound to such a consistency of firmness that it could be moulded with the hands, and the material forced into the V shaped channels to within one-half inch of the surface, and was held in place by wood battens 3 or 4 minutes or until the mixture had set and all signs of leakage had ceased. The remaining one-half inch of depth in the channels was filled with a plaster coat of one part Portland cement, two parts clean graded sand, and one part of waterproof compound, diluted with ten parts of water.

Before laying the new concrete floor, the old floor concrete was first roughened with pick axes to a depth

of from one-half to three-quarter inch, the spaces between indentations not exceeding two inches in any direction. It was cleaned of chipped concrete, sand or dirt by brooming and city water pressure, and scrubbed with a ten percent muriatic acid solution. While the cold concrete was moist, a slush coat of Portland cement and water, mixed to a consistency of thick paint, was applied and broomed well into the surface, leaving no heavy layers. The new waterproof concrete floor, varying in thickness from 2 to 4 inches, according to the necessary pitch from the walls to the main collector, was laid immediately over the slush coat.

After all repairs had been made, the structure remained open for a period of three weeks, until the volume of leakage could be determined. The repairs proved most satisfactory, well within the limits of leakage allowed. The underdrains, gravel, sand and distributing channels were replaced, and the filter was again ready for operation.

The filter sand was replaced to a depth of only 2½ feet, for the reason that the rapid sand filter removed most of the turbidity in the raw river water so that the original depth was not necessary. This increased the filter capacity nearly 100 per cent and it will now filter about 3,000,000 gallons in 24 hours.

The dike around the filtration and pumping plant has been raised to elevation 50.00, which, in conjunction with impounding reservoirs on the upper branches of the Merrimac river being constructed by the Federal Government, will make it impossible for another flood of the magnitude of 1936 high water again to affect the water supply of the city.

### Water Supplies in Ohio

In the state of Ohio, according to figures published in 1944 by the Ohio Department of Health, there are 115 cities and 431 smaller incorporated communities provided with water works. Of these, 28 cities and 27 villages filter and chlorinate their water; these varying in size from Cleveland (878,336 population) to St. Martin (population 130).

Lime-soda softening plants are operated in 29 cities and 74 villages and zeolite softening in 5 cities and 18 villages. Of these, 28 are surface supplies, 88 are ground water and 10 may be either. The lime or lime-soda process is used in places of all sizes, from 306,087 (Columbus) to 204 (Rio Grande); zeolite treatment in places with populations of from 21,940 to 616. Of the towns having zeolite plants, 11 remove iron by aeration and filtration and one by base exchange. Chlorination is included in the treatment by 27 of the 34 cities and 25 of the 92 villages.

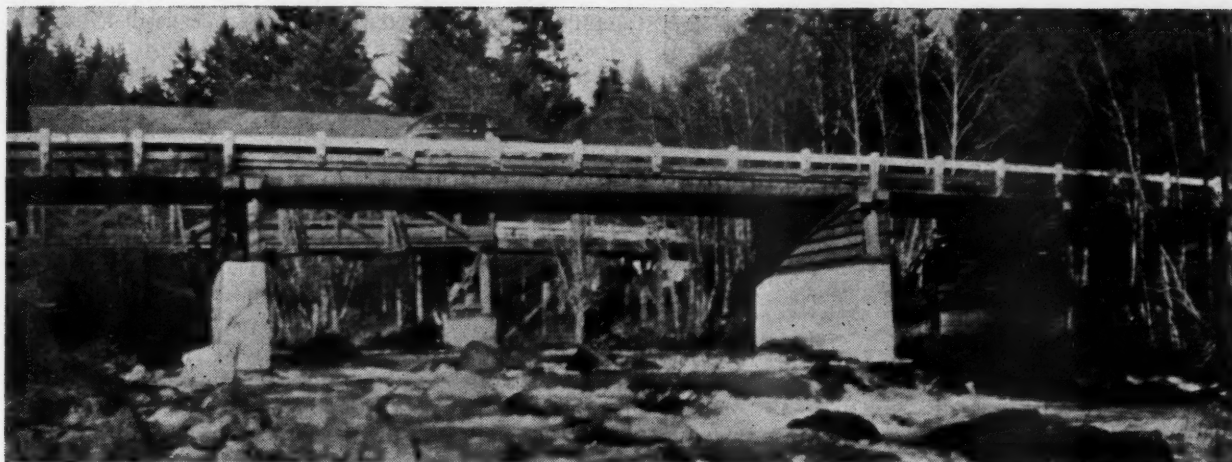
Chlorine disinfection is the only treatment given 52 groundwater supplies and 4 surface supplies.

Five small cities and 22 villages using ground water have plants for iron removal by means of aeration, sedimentation and rapid sand filtration; 2 of them applying chemicals before sedimentation, 1 removing iron by manganese zeolite, and 6 chlorinating also.

No city or village uses untreated surface water, but 10 cities with a combined population of 132,450 and 166 villages with a population of 187,503 use untreated ground water; and in 5 villages the only treatment is aeration and sedimentation.

A number of the cities serve other municipalities also, 102 municipalities obtaining their supplies from 25 others. Nearly half of these—12 cities and 34 villages—are served by Cleveland's supply, while Cincinnati serves 3 other cities and 15 villages.





Bridge No. 4—24.0 across Rock Creek. Old bridge is shown in the background.

## Building Log Span Wartime Bridges in Oregon

As several of the 470 bridges in Douglas County could not safely carry the wartime traffic and WPB would not approve timber trusses, log spans up to 65 feet length were built, as described below.

By F. C. FREAR

County Roadmaster, Douglas County, Oregon

**D**OUGLAS County, Oregon, with the largest stand of virgin timber of any county in the United States (estimated at 60 billion feet), has 922½ miles of county roads. Over at least 70 per cent of these roads, about a hundred sawmills besides many piling operators are operating fleets of heavy trucks, hauling the products of the forests to various shipping points to be shipped to the Army and Navy for the war effort. In so doing, these trucks must cross hundreds of our old and obsolete bridges. It is not uncommon to see a load of seven or eight thousand fbm of green logs, weighing on an average six to eight pounds per foot, or a net load of 32 tons, cross one of these bridges. The problem of maintaining these bridges to carry this unforeseen wartime traffic is no small one, owing to the manpower shortage and scarcity of materials which can be released from the war effort for such work.



Bridge No. 17—13.5. Double bents on 60° skew footings.

A survey of our bridges shows that we have a total of 470 structures, classified as follows: 14 steel bridges, 37 covered trusses, 331 trestles, 58 concrete spans and box culverts, 25 log spans, one foot-bridge 600 feet long, and 4 county docks. Owing to the fact that we had placed load limits of from one to five tons on five of these structures, it was imperative that steps be taken to rebuild them at once, and the County Court ordered me to make plans for their reconstruction. After preliminary surveys and plans had been made, it was our intention to rebuild at least three of these structures, using pressure-treated creosoted wood trusses suitable for a safe load of 50 tons.

Timber Structures Inc., of Portland, Oregon, drew plans for these trusses, but due to the fact that the War Production Board would not approve them at this time, it became necessary to substitute the log spans similar to those shown in the illustrations. The Cavitt Creek span, Bridge No. 82-0.0 across Little river, was the only truss built. This structure, 145 feet long, consisted of one 76-foot span housed with three 23-foot framed timber bents. For the lower chords we used two 24" x 82' logs, and for the top chords two 20" x 40' logs. This bridge replaced an old wooden truss built in 1897, and should last 50 or 60 years providing the housing is maintained. The cost of this structure was \$8807.

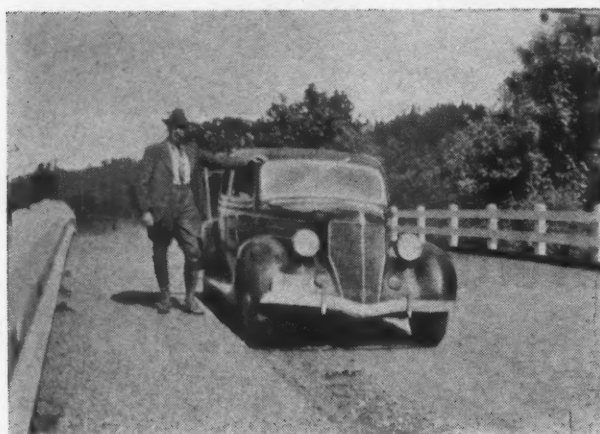
The Medley Bridge, No. 22-3.6, 192 feet long across the Calapooia creek, consisted of one 50-foot log span, using five 2½' x 52' logs and six 23-foot framed timber bents. This structure replaced an old Smith truss built in 1902. The cost of this structure was \$6408.

The Starveout Bridge, 95-0.05, 195 feet long across





Bridge No. 17-13.5, showing main span.



Bridge No. 4A-0.8.

Cow creek, consisted of one 57-foot log span, one 46-foot log span, and four 23-foot framed timber bents, replacing another log span built in 1928. The cost of this structure was \$3395.

The Rock Creek Bridge, No. 4-24.0, 226 feet long across Rock creek, consisted of one 60-foot log span and seven 23-foot framed timber bents, replacing a small Howe truss built in 1920. At this bridge the alignment was greatly improved, as the old bridge just up-stream had a bad curve on each end, while the new bridge is on a long tangent. The cost of this structure was \$8805.

I will describe in detail the last and largest of these log bridges, the Fall Creek Bridge No. 17-13.5 across Little river. It consists of two 42-foot log spans, one 45-foot log span, and one 65-foot log span. The old bridge at this location consisted of a combination wood and iron Pratt truss, 105 foot span built in 1890. Aside from being of light construction, the old bridge was only 12 feet wide and had a right angle turn at each end. The new bridge was laid out at an angle across the stream so that it was necessary to skew the piers 60 degrees from center line, and all the logs had to be framed accordingly. The top of each log in the main span was hewed so as to provide about a 4-inch camber. In the approach bents, six logs were used; but in the main span, where larger logs were used, there was room for only five logs, as one of these logs was four feet at the butt end. In placing these logs, the butts and tops were alternated on caps, as we have found from experience that these log spans fail at the top ends. On all our log spans we used roofing paper under the deck to protect the most vulnerable spots, i.e., where the deck contacts the log joists. In the structure the bents were all made of 12" x 12" 's, using six-post double bents. This was done to save framing away too much from the larger logs and also so that when any panel fails it can be replaced more readily. The bents were bolted to each other and to the concrete,

and each log drifted to the caps. We used 4" x 12" decking on all superstructures. The cost of this bridge was \$6318. The logging companies using this bridge donated and placed all the logs used.

These bridges were all built by our county bridge crew under our bridge superintendent Homer Gallop. After completion, each bridge deck was surfaced with an oil mat, using MC2 oil and chips.

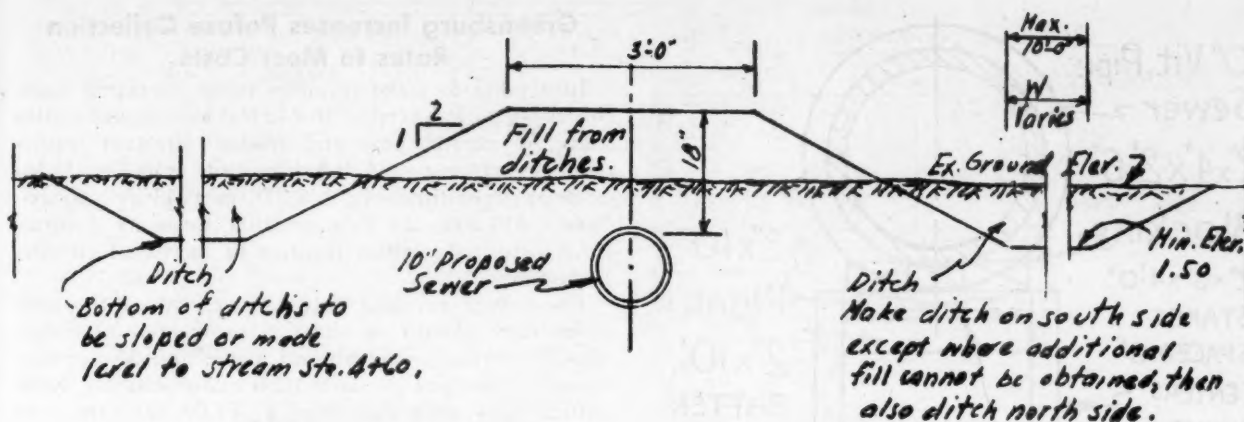
From my observations as to the trend towards larger trucking units, I believe that all the state and county road units must, in the post-war era, design bridges sufficient to carry not only present traffic but even larger units. Our county court has set aside considerable funds for post-war work in bridges and roads.

### Tests of Methods of Curing Concrete Pavements

In a paper prepared by H. C. Vollmer, research associate, National Bureau of Standards, for the 24th annual meeting of the Highway Research Board (which was cancelled) he described an investigation undertaken to compare the relative effectiveness, in curing concrete pavements of the use of burlap and the use of several liquid curing compounds and the use of calcium chloride both integrally and as a surface application. The study included tests of concretes cast and cured at 70°F. and at a relative humidity of 50-60 per cent, concretes cast and cured at 100°F. and at a relative humidity of 25-35 per cent, and concretes cast and cured under field conditions. The evaluation tests include flexural strengths of beams, compressive strengths of beam ends and resistance to abrasion of the cured surfaces. This report, presented as a progress report, presents only results of tests on the concretes cast and cured at 70°F.

The use of damp burlap for 18 hours and with calcium chloride used either integrally in the concrete or spread on the surface of the concrete upon removal of the burlap, resulted in 28 day flexural strengths of the same order as obtained with wet burlap applied for 3 days, the accepted standard for highway construction. The use of surface calcium chloride applied as soon as the bleeding water disappeared (no burlap at all) resulted in strengths only some 7 per cent lower than those obtained by the procedure requiring burlap. The 28 day flexural strengths obtained by the use of liquid curing compounds were 16 to 19 per cent lower than those obtained with the 3 day burlap curing procedure. Flexural strengths obtained by continuous damp curing of the specimens for 28 days (which however is not a practical method under field conditions) were higher than obtained by any of the other procedures described, and strengths obtained on specimens receiving no curing treatment were considerably lower.

Tests of the resistance to abrasion of the top surface (cured surface) of the specimens indicated that the use of 1½ per cent calcium chloride integrally and 1½ lbs. per sq. yd. applied to the surface as soon as the bleeding water disappeared (no burlap) and all specimens cured by employing the surface application of calcium chloride whether in conjunction with burlap or not, resulted in a higher wear resistance than specimens cured with wet burlap applied for three days; however the wear resistance of specimens with liquid curing membranes or with no curing were somewhat less than the specimens cured with wet burlap applied for three days.



## A Sewer Laid Through a Swamp on Timber Grillage

How a thousand feet of ten-inch vitrified pipe sewer was laid through a swamp of black muck on a wooden grillage supported by piles.

By **DON D. WILLIAMS**

City Engineer, Corry, Penn.

**T**HE City of Corry, Pennsylvania, had a 10-inch sanitary sewer outletting into a small stream, which would practically dry up during the dry season of the summer and fall. In the summer of 1943, as a temporary measure to relieve, at least partially, this unsanitary nuisance, it was decided to extend the sewer 1252 feet eastwardly to a point of outlet into another stream with a much greater flow. Later, in connection with the future construction of a sewage treatment plant, this sewer is to be extended some 1800 feet further to the southeast to the plant site.

A black, mucky swamp lay in the path of the proposed extension for nearly its entire length and some provision had to be made to support the pipe and maintain its alignment and grade. A wooden grillage or cradle was designed for this purpose.

Construction was begun in August during the dry



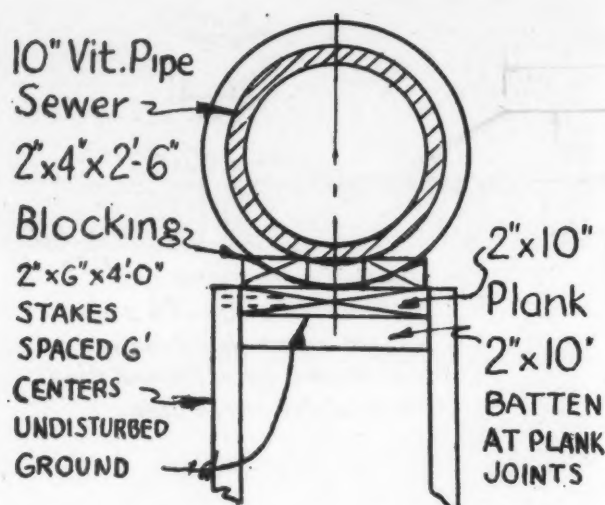
Half-yard Bucyrus-Erie gas shovel.



Don D. Williams,  
City Engineer  
of Corry, Pa.

season, when practically all surface water had dried up. The trench was roughed out by a  $\frac{1}{2}$  cu. yd. Bucyrus-Erie gas shovel, using timber mats for road bed. Hand shovels were then used to bring the bottom approximately to grade. Two-inch by 6-inch timbers, four feet long, which had been pointed were driven in the trench at six foot intervals on both sides of the construction center line, with the width of a 10-inch plank between them. They were driven to an elevation where their tops were approximately the thickness of the pipe wall plus bell below the sewer flow line. Two-inch hard-wood plank, 10 inches wide, were laid longitudinally on the bottom of the trench between the driven 2 x 6-inch pieces.





Detail of wood cradle for sewer.

At the joints between these planks, a 2 x 10-inch batten 3 feet long was placed under the planks to make a splice, and eight 16D nails were used on either side of the joint. The bottom of the trench when dug was left slightly above the theoretical grade and the plank, after being laid, were tamped by mechanical tampers down to an elevation which would place the invert of the pipe laid on them exactly at grade. Each driven 2 x 6-inch was then spiked to the edge of the planks by means of three 20D nails.

The pipe was then placed. Joints were made of poured bituminous material; only every third joint was poured in the trench, other joints being poured with pipe standing on end on a level platform.

The pipes were blocked in place by means of 2 x 4-inch pieces of lumber 2 feet and 6 inches long, placed on either side of each joint of pipe between bells, and each piece was spiked in place with four 16D nails.

The grade line of the sewer for the most part was not far below the surface of the ground. Shallow ditches were dug on either side of the sewer for a twofold purpose; first, to partially drain the swamp and second, to provide sufficient material to form a minimum cover over the pipe 18 inches deep.

Trench backfill was placed by hand shovel and care was taken to thoroughly tamp the earth in under and around the pipe. Only a few shovels full were thrown in around the pipe at a time and wooden 2 x 4's were used to crowd the material in under the pipe. The fill was brought up evenly on either side until the pipe was covered. The remainder of the backfilling was made in 2-inch layers and thoroughly tamped with hand tampers until the trench was completely filled or to an elevation at least 2 feet above the top of the pipe.

The Keystone Construction Company of Meadville, Penna., was the contractor and their superintendent commented on the ease with which the pipe was laid and held to line and grade, by using this method of providing foundation. The sewer had to be laid to 0.24% grade to meet control points, so it will be understood that care had to be taken in seeing that each joint was placed exactly to grade in order to prevent any pockets in the flow line.

Four manholes were constructed with their tops at an elevation well above any known high-water mark and their outside surfaces were well plastered with mortar; so, with the carefully constructed pipe joints, we have a sewer free from infiltration, although laid through a location where conditions were most unfavorable.

## Greensburg Increases Refuse Collection Rates to Meet Costs

In a move to make revenues cover operating costs, Greensburg, Pa., (pop. 16,743) made an exhaustive study of expenditures and refuse collection service charges early last year. When receipts from fees failed to offset expenditures of \$35,276 in 1943 by approximately \$10,000, the Pennsylvania Economy League, Inc., instituted studies leading to increased charges to the users.

The survey revealed that 65 per cent of the total expenditure should be charged to residential collections of garbage, rubbish and ashes, and 35 per cent should be charged to commercial establishments. Residential rates were then fixed at \$1.00 per family in single houses and duplexes, 80¢ per family unit in apartments and 65¢ per unit in multiple dwellings with more than eight family units. The above rates cover collection of garbage and rubbish only, while similar charges are levied for ash collection.

Charges for the collection of refuse in the commercial bracket were complicated by the wide divergence in the character of the establishments. Rates for these collections were based upon studies of volume, time required to make the collection, and the estimated unit costs thereof. Sixteen types of commercial establishments were defined and rates for the collection of garbage, rubbish and ashes were fixed for each category. Hotels, for example, are paying fees ranging from \$2.50 per month for garbage collection at hotels less than 20 rooms, up to \$50.00 per month for garbage collection from hotels of more than 150 rooms. In addition, if the commercial establishment elects to use the rubbish and ash collection service, charges are made in accordance with the carefully drawn schedule in the new ordinance.

A postal card billing system similar to that used by public utilities is used as a collection measure. Monthly billing for commercial establishments, and quarterly billing for residential collection fees is made. A 20 per cent discount is allowed for advance payment.

A citizens' committee composed of representative businessmen and the superintendent of refuse collection reviewed and approved the schedule of commercial collection rates.

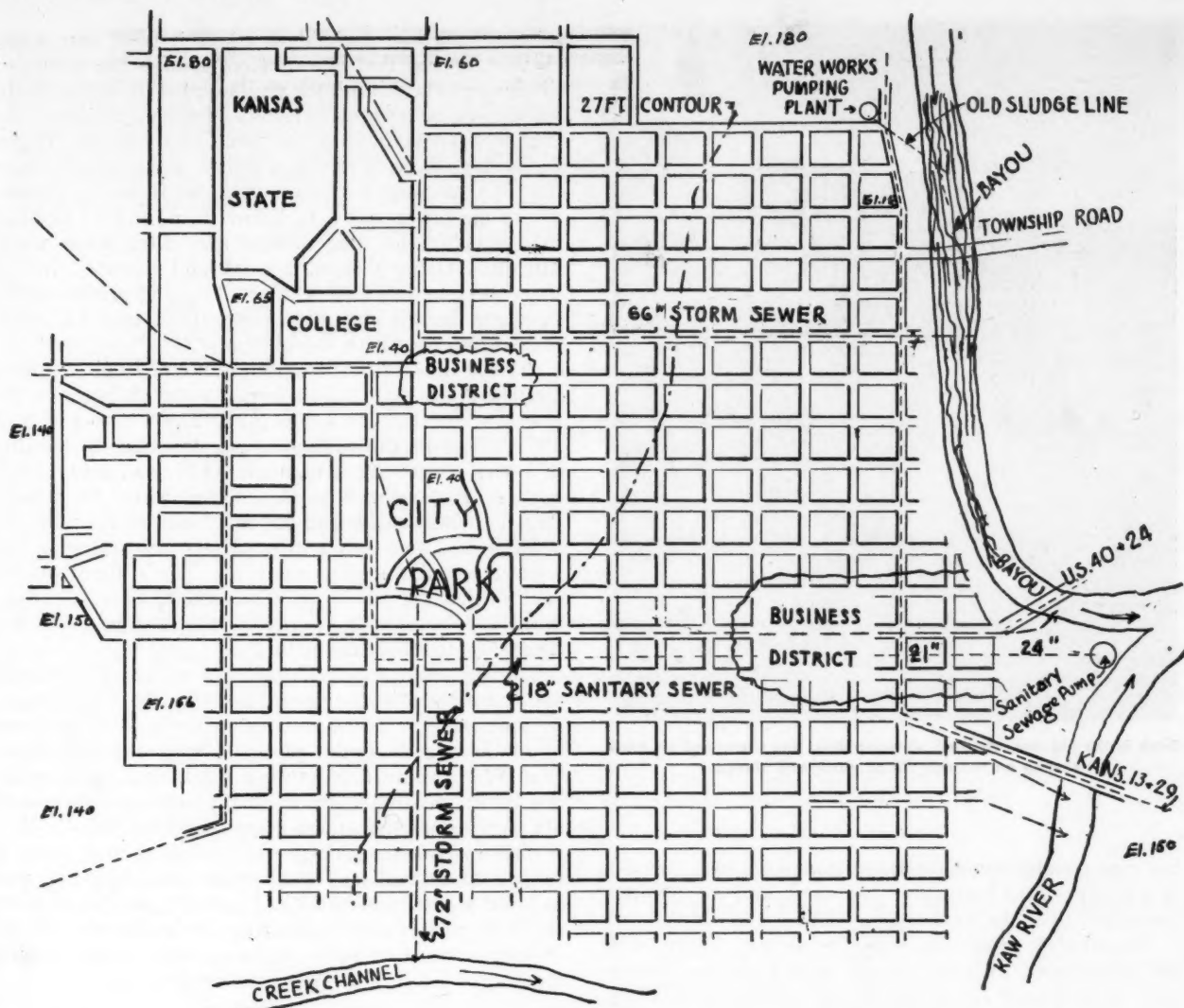
From "Public Works Engineers' News Letter."

## Sanitary Equipment in Mexico

Mexico will provide an important market for sanitary equipment after the war, says William M. Johnson, chief engineer of the Inter-American Cooperative Health Service in Mexico. Mexican engineers are very favorably impressed with the superior qualities of United States sanitary equipment, preferring it to the more highly decorated but far less practical equipment obtained from Germany before the war. Many Mexican engineers studied in the United States and praise our engineers and methods as well as supplies. Others who are unable to converse in English are able to read our textbooks readily, which are used in many of the recognized sanitary engineering courses in Mexico.

Mexico's postwar program includes water supply and water treatment among the major projects, others being sewer construction, sewage treatment and health centers. Nine water supply systems, four sewer projects and two health centers are now under construction, and a water supply system and filtration plant are planned.





Map of Manhattan, Kans. Elevations are above extreme low water. The 27-ft. contour is extreme high water mark—reached twice in 85 years. Dash lines are storm sewers. Dotted lines are sanitary sewers.

## How Manhattan Disposes of the Lime-Sludge From Its Softening Plant

A nuisance and continuous headache for all concerned was eliminated by discharging the sludge into the sanitary sewer system.

By E. C. PFUETZE

Utilities Commissioner, Manhattan, Kansas

**T**HE city of Manhattan, Kansas, population 13,400, has an area of 1,387 acres. The eastern two-thirds is flat but the western part rises to an elevation of 100; and this and the high land west of it drains east across the city.

The Blue river was formerly the eastern boundary of the city and served as a drainage outlet for over half the area; but in 1909 the stream moved east 3300 yards, leaving the old channel as a bayou which in ten years filled to a depth of some 6 to 8 feet with muck and debris. Our sanitary sewer, completed in

1911, empties into the Kaw river at its outlet into the old Blue river channel.

In 1922 the city installed a lime-soda ash water softening plant, which reduces the hardness from 450 ppm to 85 ppm carbonate hardness. The sludge from the 5,000 pounds per day of lime used was dumped into the bayou, and in fifteen years, by 1937, a serious drainage problem had arisen. The channel became choked with willows, weeds and silt and threats of nearby farmers of law suits for damages and abatement of the nuisance were a recurring headache for



Ditch in the old river channel, showing drag line supported on mats resting on the soft fill of muck and sludge.

the city commissioners. Sludge and mud bars formed to a height of 12 feet above low water and the channel continued to choke with boxes, rubbish and sludge.

The sludge from the water treatment basins was the chief cause. It was a gooey mess from four to six feet deep, spread along the side of a highway leading into town. It was too thick to flow to a pump and too thin to scoop, especially near the ditch. There was no market for the sludge, even if dried; reburning it would be costly and priorities for the necessary machinery stopped us cold. Moreover, we are very crowded for space at the water plant, with a highway, a railroad and a bluff behind us and a street at the side, and there was no room for a recalcining plant. For three years we tried using 580 feet of 15" corrugated pipe to carry the sludge to the higher ground in the bayou to drain out, leaving only clear water to be removed by the channel; but freezing weather and shade from weeds prevented the success of this.

Meanwhile we built a storm sewer system to concentrate the run-off from the city streets, hoping thereby to keep the channel clear; but during high water backwater from the rivers checks the velocity of flow in the channel, when the silt settles and the sludge covers additional acres.

In May 1944 we hired by the hour an optimistic drag-line operator, who had just finished a nearby government job, to dredge out this channel, but after four days his machine stood under a 22-foot stage of water and he quit. A month later, after the rains had stopped, using another machine with a fine operator, two 6 x 10 ft. mats of 2" oak plank, and a man to cut brush, we excavated the ditch to a bottom width of 4 to 5 ft., averaging 120 yds. a day.

This temporarily relieved the situation but did not solve the sludge problem. Seven years ago I had had a hunch that proper discharge of the sludge into a nearby 18" sanitary sewer was the only permanent

solution, and we decided to adopt it now. Our water chemist agreed that it would not change the nature of the sewage materially, the engineer for the State Board of Health offered no serious objection, and the city engineer (now in army service) checked the figures for sewage flow, levels, etc. There was a manhole on the 18" intercepting sewer 585 ft. from the basins, where the sewer was 3 ft. below them, and we decided to discharge the lime sludge and filter wash water into this. Using 6 men, a truck and a winch, in five days we removed 220 ft. of the old 15" sludge outlet to a new trench and added 366 ft. of new 12" pipe, thus connecting with the manhole.

At the time of our next semi-annual basin cleaning we tested the plan by discharging the sludge into the sewer at the rate of 1,000 gpm. There was a rise of 19" or less in the first manhole, tapering to nothing 375 yds. away. At a manhole 1125 yds. away quite a surge is developed as the cooling water from theatres, bottling works and ice machines mixes with the sewage and one can hardly detect any color in the sewage when it reaches the river. The system was recently used for the third semi-annual basin cleaning and there seems to be no reason why it should not continue to function satisfactorily.

During high water stages (six weeks this season) we pump the sewage, now including the lime sludge, so that there is no backwater to cause slowing down of the flow in the outlet pipe and resulting sedimentation. We are thus able to wash filters and basins without back pressure, even when the river stands one to six feet higher than the bottom of the basins.

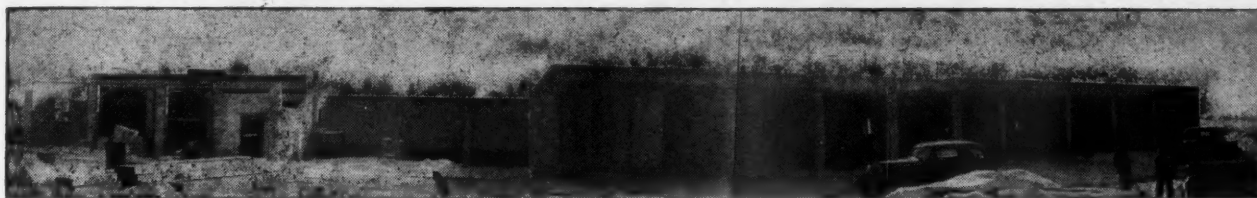
The cost of the change was nominal and there is no cost of operation. The alternate plan proposed was to build a detention basin and install a pump and 6300 ft. of 8" cast iron pipe crossing two railroads, 100 ft. of switch yard, a state highway, two storm sewers, an 8" gas main, and other obstructions.

### Equipment Within Coverage of Payment Bond

In an action on a payment bond given under the Miller Act for the protection of all supplying labor and material in the prosecution of the work provided for in a contract with the Government for the construction of certain improvements at a municipal airport in Oklahoma, the Tenth Circuit Court of Appeals (*Continental Casualty Co. v. Clarence L. Boyd Co.*, 140 F. 2d 145) affirmed a judgment of the Federal District Court for Northern Oklahoma, with certain modifications.

Repair parts, appliances and accessories which add materially to the value of equipment and render it available for other work are held not within the coverage of such a bond. Repairs to dirt-moving equipment leased to the contractor were held not within such coverage; nor a pipe wrench purchased in connection with such repairs.

But rental for the equipment used in the performance of the work, necessary parts, equipment and appliances wholly consumed in the performance of the work, and current repairs compensating only for ordinary wear and tear are "labor and materials" within the coverage. Also included therein was held to be material furnished to the contractor to convert a stationary light plant into a portable light plant, this material being substantially consumed in the performance of work provided for in the contract.



Panoramic view of building 206 feet long containing garage, machine shop and storage shed.

## Bonneville County Builds a Garage

**A building 206 feet long contains 16 stalls for garage, machine shop and storage shed and a weed killing building.**

**By W. L. BREWRINK**

*Clerk of the District Court*

**B**ONNEVILLE COUNTY, Idaho, has built a new garage, a machine shop and storage shed 75 feet long, at one end of which is a two-floor building for weed machinery and supplies of chemicals for weed killing. The entire building is 206 feet long and 40 feet deep.

Beginning at the left in the photograph, the first four stalls have double doors 12 feet wide and a fifth which is not quite so wide and has an ordinary door cut in on one side for entrance for men. Each of these doors contains a window and there is also light from rear. The floors are gravel and concrete. Trackage and a chain hoist are provided for moving materials; also welding machines and other tools. Enough room is provided in the shop to permit two or three trucks or graders to be worked on at one time.

Next to these five doors are three stalls for running in trucks, or for storing lumber (if and when we can get it). Then come two stalls for the road and bridge boss, containing space for a truck or pick-up and for a table, map drawers, etc.

Three open stalls (not yet roofed) will be used for winter protection of various units. Further to the right are three more stalls, one about 12 ft. and the other two about 14 ft. outside dimensions. The front 20 ft. of these is not yet roofed but will be. (This description was written on February 7th).

Back of the last-named stalls is the weed poison storage building 20 x 40 ft., with a basement having a concrete floor. The floor above is of heavy timber and is set at the elevation of the bed of a truck standing on the adjacent road, so that casks or drums can be rolled directly from or onto the trucks, at either the front or back of the building. A platform hoist is

provided for moving the poison containers to or from the basement. Also a stairway connects the basement with the main floor.

To the right of this is one more stall, not yet completed.

All the roofs are covered with a good grade of asphalt roofing. The construction in general is of gravel concrete, a good grade of gravel being available locally, mixed in a Jaeger mixer.

### Municipalities Building Garages

Wichita, Kansas, is now establishing a central municipal garage. Janesville, Wisconsin, will construct a municipal garage adjacent to the waterworks so that it can be heated from the water plant. Riverside, Illinois, is planning to centralize the handling of motor equipment at a central municipal garage. A county garage being built by Bonneville County, Idaho, is described in this issue.

### Lack of Advertisement for Bids Invalidates Contract

An oral agreement was made between a contractor and a town for the rental of a bull-dozer at \$200 per month or, in the alternative, a purchase rental agreement of \$200 per month rental, to be applied on the purchase price of \$1800. The town used the machine four months, made one payment of \$200 and returned the machine. There was no advertisement for sealed bids for the contract. In an action for \$600 rental, submitted on an agreed statement of facts, the trial court found that there was an ordinance of the town requiring advertisement for bids for purchases or contracts for purchases of equipment, etc., exceeding \$500 in amount.

The Massachusetts Supreme Judicial Court held (*Cerwonka v. Town of Saugus*, 55 U. E. 2d 1) that it was uncertain whether the one agreement the parties made was a "rental agreement," which for all that appeared would have been valid, or a "purchase rental agreement" for \$1800, which plaintiff conceded would have been invalid; and as the burden of proof of establishing the contract was on the plaintiff, and the trial judge could and did find for the defendant on the ground that the parties had made an illegal contract of purchase, the plaintiff could not recover.



Rear view of part of building.





# Atlas Announces

## An Important Improvement in Bell & Spigot Main Jointing



### THE HYDE-RO RING

*Speeds Sterilization*

*First Hypochlorite Flushing invariably secures negative reaction*

*Promote Economy • Facilitates Repairs*

*Easily Applied in Making Joint*



Cut . . . to show  
cross section.

### CONSIDER THESE DETAILED ADVANTAGES:

① **PREVENTS CONTAMINATION**—Rubber cannot harbor bacteria nor support their growth internally where water main sterilizing agents cannot reach them. The use of HYDE-RO Rings will prevent continued recontamination that has been traced in many cases to the joint packing.

② **ECONOMICAL**—The cost of HYDE-RO Rings is insignificant compared with the cost of repeated treatments with hypochlorite or the cost of sterilizing and keeping sterile (if it can be done) other types of packing.

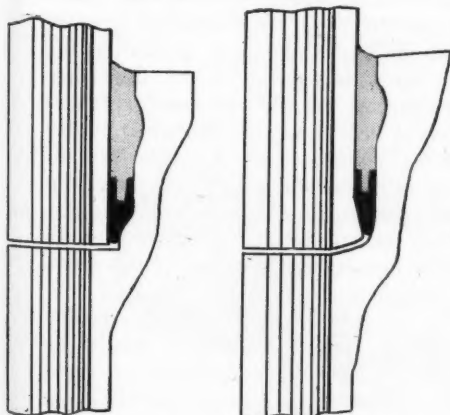
③ **CONVENIENT**—The installing of HYDE-RO Rings is a simple, easily understood operation. There is no measuring to be done and no cutting. The wrong size cannot be used. Since rings are solid, there are no laps to be inspected to see that

they do not occupy too much of the joint space. The same ring fits pipe with bead on spigot or straight end pipe. The narrow iron blade used in caulking the ring automatically slips into the groove in the back.

④ **HOLDS BACK WATER**—When HYDE-RO Rings are used, the pouring of wet joints is unnecessary. The rubber ring caulked tightly into place effectively dams off water from leaking valves and permits pouring of dry joints. This is especially important in repair work.

⑤ **CONVENIENT TO STORE**—HYDE-RO Rings are supplied in cartons each containing fifty rings. The packages are light in weight and convenient to handle and store. Rings are manufactured for 4", 6", 8", 10" and 12" cast iron pipe.

Cross section showing HYDE-RO Ring  
caulked into position



Plain End  
Spigot Pipe

Beaded End  
Spigot Pipe

Write our Mertztown office for further information.

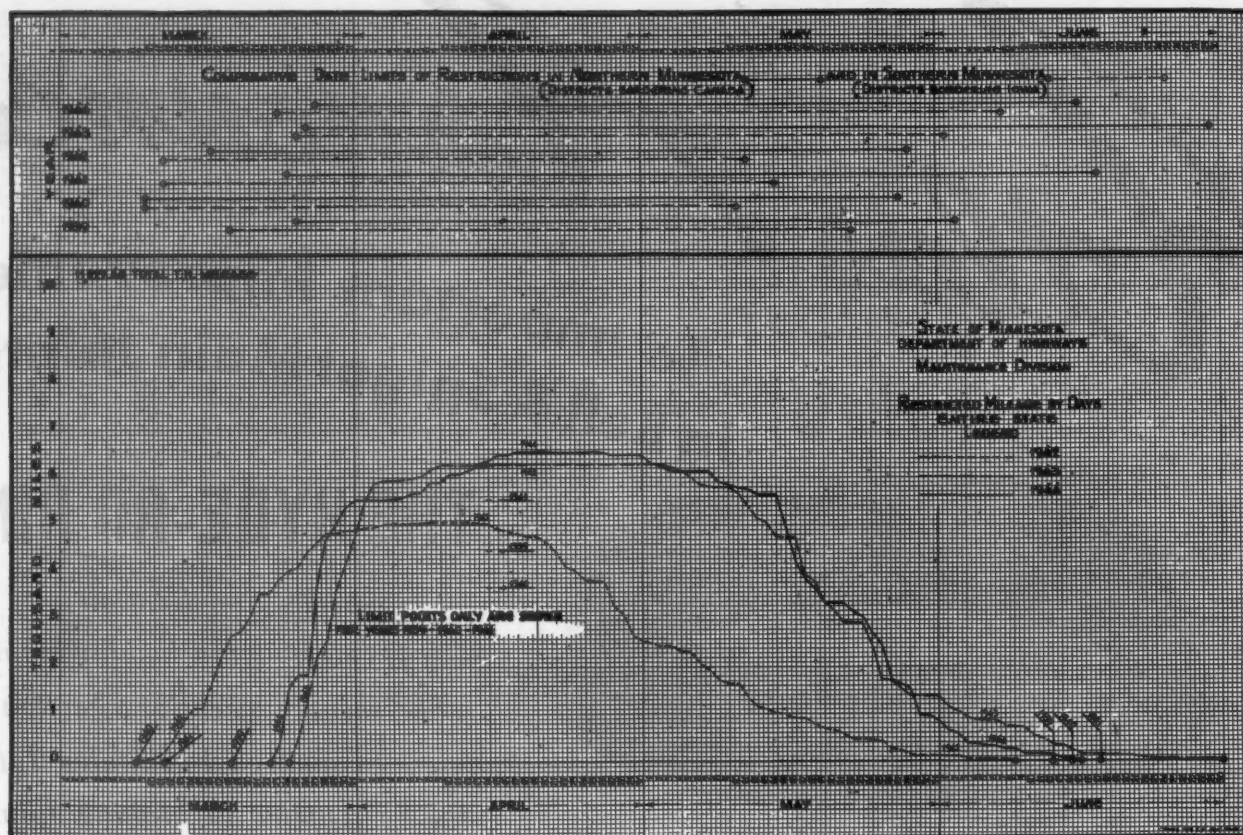
THE  
**Atlas Mineral**  
PRODUCTS COMPANY OF PENNA.  
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\*ATLANTA 3, Ga., 161 Spring St., N.W.  
\*CHICAGO 1, Ill., 333 No. Michigan Ave.  
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\*SALT LAKE CITY 11, Utah, 1212 So. State St.  
\*LOS ANGELES 12, Cal., 817 Yale St.  
\*SEATTLE 14, Wash., H. D. Fowler Company  
P. O. Box 3084  
\*Stocks carried at these points





Restricted mileage of Minnesota highways by days, 1939 to 1944.

## Spring Load Restrictions in Minnesota

**Experience demonstrates that the maximum axle loads on local and trunk highways should be reduced by state law to take effect before the spring break-up begins and continue until the roads are compact again.**

**I**N his report for the biennium ending June 30, 1944, M. J. Hoffmann, Commissioner of Highways of Minnesota, says:

"Experience on local roads as well as trunk highways has demonstrated that restrictions are necessary every spring on many roads to protect the road surfaces and to keep the roads open to light trucks and passenger vehicles. Such restrictions, of course, cause inconvenience and hardship to truck and bus owners and in some cases cause considerable complaint. As a result, the responsible officials are sometimes prone to delay the posting of restrictions until road damage becomes definitely apparent.

"I would recommend that you consider enacting a law similar to the Michigan law under which normal maximum axle loads are reduced 25 per cent on hard surfaced roads and 35 per cent on all other roads during March, April and May. In addition to these specific limitations by law, the highway authorities are empowered to make even greater restrictions where circumstances so justify. Fixing the spring load restrictions by law would unquestionably have more effect in securing observance on the part of road users. Our trunk highway experience shows that imposing the load restrictions on a certain date, as could logically

be done by law, will save taxpayers large sums of money in repair costs and keep the highways usable by lighter vehicles without interruption.

"Load restrictions were put into effect, as usual, during the spring breakup months of March, April and May—and it might be stated here that the problem of safeguarding highways against serious damage during these months is still far from a proper solution. Each succeeding year brings along an increasing number of trucks used for carrying gross loads of greater axle weights. While the state laws have permitted the use of 9-ton axle loads for many years, very few trucks imposing 9-ton axle weights on road surfaces were in use until recent years. As the number of trucks of this type increases, it becomes increasingly evident that many miles of our roadways will not stand up under the frequent passage of such loads during the spring breakup period, when the road grades are likely to be softened following the thawing out of the frost.

"The Highway Department now has records, covering a long period of years, which show clearly the extent to which certain trunk highways should be restricted each spring. Efficient protection of these highways requires that the restrictions be posted *before*

(Continued on page 54)



## A sound plan for peacetime jobs in your community

America's network of highways and secondary roads is in need of three billion dollars' worth of repair and new construction annually.

- ▶ *This expenditure can mean the steady employment of millions of people for many years.*
- ▶ *It can act as a stabilizer for periods when private construction drops.*
- ▶ *It can go far toward doing away entirely with the threat of relief work and unemployment.*

This situation presents an opportunity for you to be of very real service to your community. Why not lay the facts before your local government — *now*, while there is still time for sound postwar planning?

And remember this: The use of Tarvia in the building of needed miles of secondary and feeder roads in your community will mean the employment of *local* materials, supplied and applied by *local* labor. That can mean a lot of jobs for a lot of folks in your community, when jobs may be needed.

### THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

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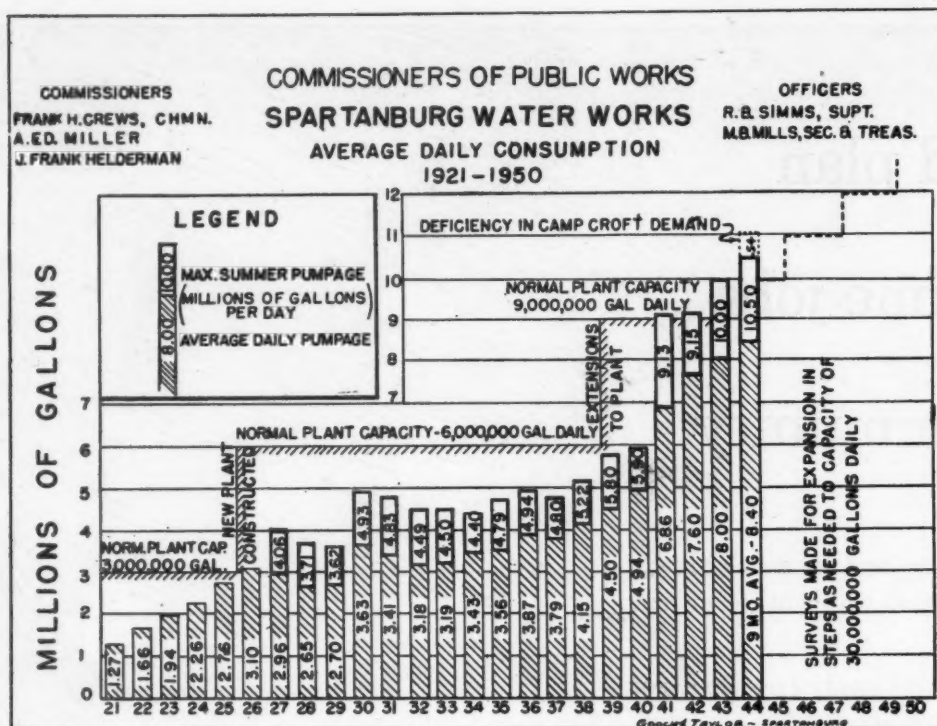
In Canada: The Barrett Company, Ltd., Montreal, Toronto, Winnipeg, Vancouver.

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\*Reg. U. S. Pat. Off.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 71-73





This chart shows the water works post-war growth of World War I.

Each month in 1944 has shown a substantial increase of water consumption over the corresponding month of 1943.

## Spartanburg's Water Works Prepares for Continued Growth

**The Commission has set aside \$312,000 from its revenues for increasing the capacity of the plant when the materials and labor become available.**

Spartanburg, South Carolina, had a population in 1940 of 32,249. In that year it completed a water treatment plant with a rated capacity of 12 mgd, for purifying its supply taken from the S. Pacolet river. This water was distributed to 35,000 population at the average rate of 4.5 mgd.

The treatment consisted of applying alum, lime and activated carbon, chlorine and ammonia, mixing by means of baffles, sedimentation, passing through rapid sand filter, post-chlorination and pH adjustment. The treatment is under laboratory control, which includes both chemical and bacteriological analyses. Elevated storage for 1,800,000 gals, was provided.

According to the 1944 report of the Auditor, there was an excess of \$60,638 over the year's expenditures, which is being reserved to meet the accumulating needs of the plant when materials and labor become available; for which purpose the Commission has set aside \$312,000 from funds on hand and future revenues. These needs include increasing the overall capacity of the plant by additional pumping equipment and settling basin; an additional storage reservoir and repairs to an old one, and improvements in the distribution system.

The water works has \$231,430 in available funds, \$32,176 of it in stocks and bonds, \$190,000 in U. S. Treasury bonds and notes, and \$5,911 in other securities.

The growth of the water works between June 30th 1920 and June 30th 1944 is shown by figures pre-

pared by R. B. Simms, superintendent, to have been as shown in the table presented below:

	1920	1944
Water mains inside the city.....	50 mi.	206 mi.
Fire hydrants inside the city and on city property.....	241	708
Fire hydrants outside the city....	None	396
Meter connections .....	2250	8500
Plant value .....	\$468,244	\$2,324,400
Indebtedness .....	273,503	1,194,000
Water pumped per year, gallons..	463,550,000	2,953,710,000
Water pumped, average per day..	1,270,000	8,092,300
Total income .....	\$129,985	\$321,530
Income per million gal. of water pumped .....	280	106
Total operating expenses.....	87,485	226,057
Operating expenses per million gal. of water pumped.....	188.72	76.53

The charges for water sold on a sliding scale rate, which applies to all consumers alike, has been reduced from 50c. per 1000 gal. to 25c. for small water consumers, and from 15c. to 8.5c. for large consumers.

### Regional Sewage Disposal in California

The boards of supervisors in Napa and Santa Clara counties of California are financing a study of metropolitan sewage disposal for the Napa area and the densely built up portion of Santa Clara county roughly outlined by Los Gatos, San Jose, Los Altos and Mountain View. This, says the State Dept. of Health, "will greatly simplify the increasingly difficult problem of finding sites for sewage disposal which do not offend or hurt the neighborhood."





## AQUA NUCHAR'S *on the move!*

On fighting fronts the world over, the S.O.S. are receiving an S-O-S from our forces for stocks of Aqua Nuchar Activated Carbon! Yes, an important item on the Service of Supply's list is the activated carbon that purifies water by *adsorption*.

Our army and navy receive clear, palatable water—and Aqua Nuchar's role is even more important when you remember that activated carbon is doing a big share in the job of making water safe and palatable for our advance fighting men and field hospitals.

Aqua Nuchar, at home or abroad, is *the* method of purification, because it works on

the *adsorptive* principle—trapping algae and other aqueous impurities in the many faceted surface of each microscopic particle of carbon.

For your community and for Uncle Sam's vast city of service men, Aqua Nuchar is economical because small amounts of Aqua Nuchar work wonders. Yes, in the average community the cost of Aqua Nuchar Activated Carbon has proven to be less than two cents per capita per year.

Write or wire for information today. An Aqua Nuchar representative will be glad to call on you.

### BLUEPRINT NOW!

But above all, remember there is a war yet to be won.  
Maintain equipment to assure operation at 100% efficiency.



## INDUSTRIAL CHEMICAL SALES

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230 PARK AVENUE  
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35 E. WACKER DRIVE  
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748 PUBLIC LEDGER BLDG.  
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844 LEADER BLDG.  
CLEVELAND 14, OHIO



## Objectionable Features of Kudzu

**In spite of its many advantages, if allowed to spread unchecked it may become a pest.**

In our issue of June, 1944, we published a short article describing the advantages of Kudzu, an oriental plant, for preventing erosion on steep banks. Apparently the use of this plant has its disadvantages also. These are emphasized in an article in the *Highway Magazine* (published by Armco Drainage Products Ass'n) by A. E. Holmes, landscape engineer of the Mississippi State Highway Dep't. Mr. Holmes says:

Kudzu makes a beautiful bank. The large, heavy,

dark green leaves, like those of a luxurious morning glory, are attractive and add much to the appearance of rough and wooded hillsides.

The ability of this plant to stop erosion is beyond dispute. If Kudzu can be established even in the worse erosion areas, it can and will stop further erosion and eventually help fill even the worst washes.

The value of Kudzu is not alone in the vine but in the heavy litter which the leaves make at the first hard frost. This litter is kept in place by the vines. Kudzu will take root at each joint, each becoming a crown and growing independently from the mother crown, thus criss-crossing to make a perfect mat.

Our first crowns were bought from a commercial nursery. At present we can supply ourselves by digging and transplanting surplus crowns. These are dug, the roots lightly trimmed, placed at once in a tub of mud and water, transported, and then planted from this tub. Best results have been obtained by keeping the crowns wet and fresh.

In our climate, all transplanting should be done between March 1 and April 15, or just before the crowns put out their first leaves. In planting, holes were dug 12 inches square and about 12 inches deep. These were half filled with well rotted barnyard fertilizer; basic slag or agricultural limestone was added in liberal quantities and then the holes filled with the best soil available. The crowns were then planted and well tamped.

This method brought excellent results and rank growth of vine. The first planting was at 3-foot intervals at the top and bottom of a short bank 5 to 7 feet high. From the bottom we used canes to allow the vines to climb.

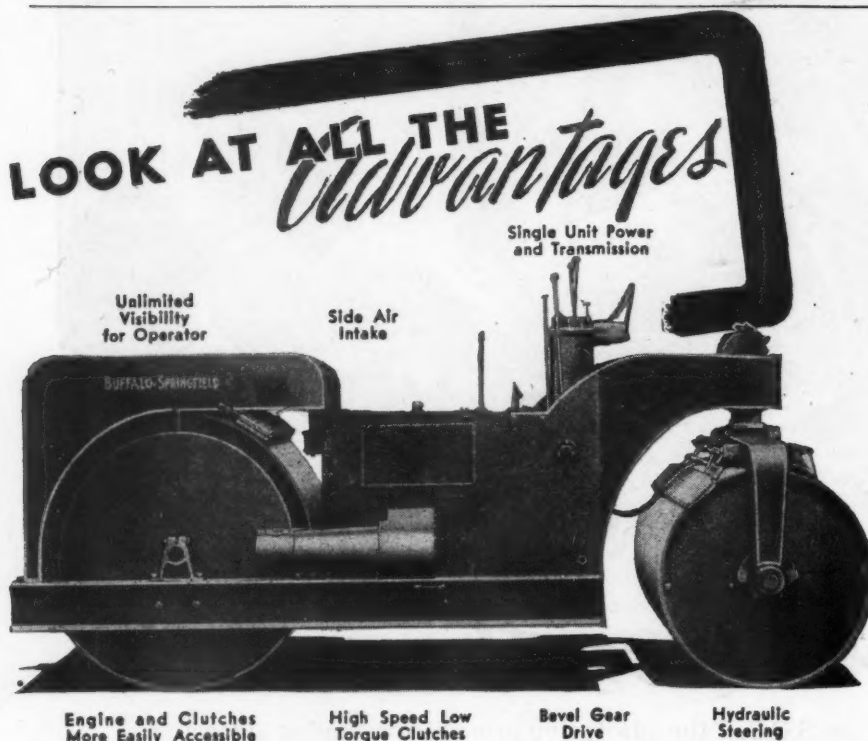
On longer slopes the plantings were made in rows spaced 3 feet apart, and at 3-foot intervals in the row. These were staggered to give best coverage. Within three years perfect coverage was obtained.

During the fall and winter months the planting must be protected from fire. Fire will destroy the litter and vines but kills few of the deep rooted crowns. Some trouble has been caused on steep  $\frac{1}{2}$  to 1 and 1:1 slopes in loess soil where excessive rains caused Kudzu-covered slopes to sluff off badly.

### Warning

Kudzu is no cure-all. In fact in manuals on plant life it is classified as a pest and therefore in the opinion of this writer should be used with discretion, lest it get out of control. Its use should be limited and confined to areas where ordinary erosion prevention measures are ineffective or too costly.

Slopes that can be flattened to 4:1 or 6:1 and easily sown to grass, should not be given over to Kudzu. Nor should any vines of rank growth be placed where they can encroach



### ... Buffalo-Springfield Tandem Rollers

THESE FEATURES are the result of more than half a century of specialization in the design and manufacture of road rollers. Every detail is engineered to give Buffalo-Springfield rollers longer life, lower maintenance, better performance, and easier operation. That's why there are more Buffalo-Springfield rollers in use than all other makes combined. In addition to tandem rollers from 2 to 21 tons, the line includes three-wheel rollers from 6 to 12 tons, 3-axle tandems from 9 to 17 tons, and trench rollers for widening work.

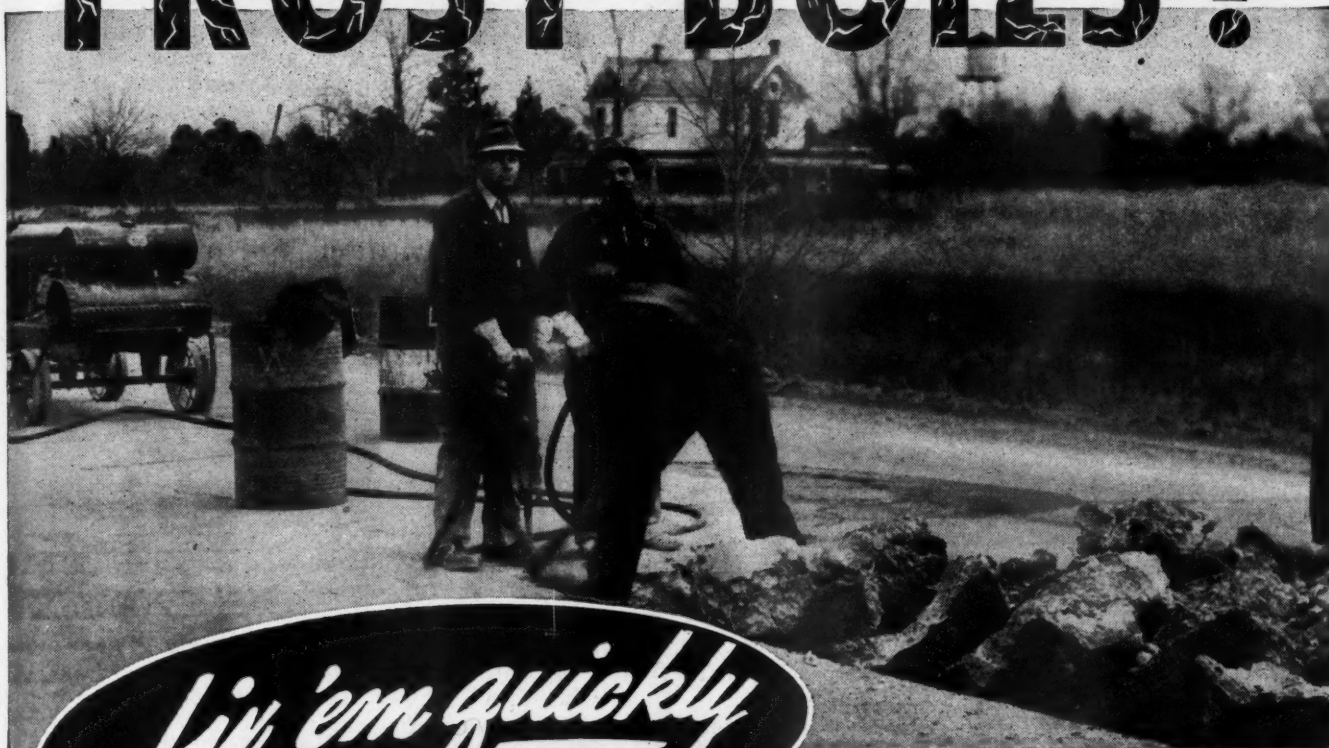


**THE BUFFALO-SPRINGFIELD  
ROLLER COMPANY** Springfield, Ohio

**The Oldest and Largest Builder of  
Road Rolling Equipment in America**

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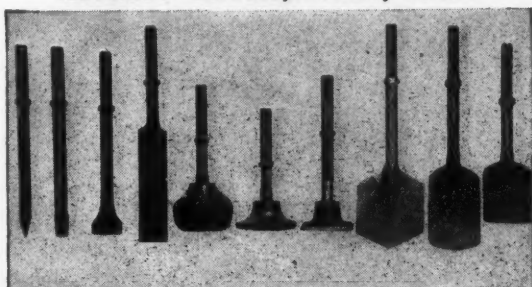
# FROST BOLLS?



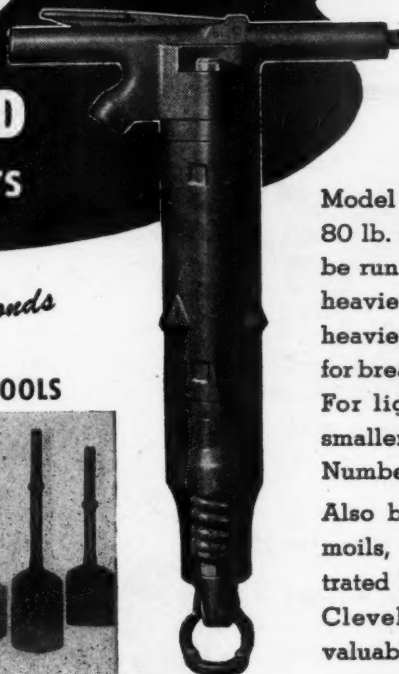
*fix 'em quickly*  
WITH  
**CLEVELAND**  
Paving Breakers

*Speed Final Victory!  
Buy More War Bonds*

**CLEVALOY CHISELS, MOILS, TOOLS**



Moil Narrow Wide Digging Sheeting 7" Tamper 5" Tamper Clay Clay Asphalt  
Chisel Chisel Blade Driver Bar Bar Blade Spade Cutter



**C7**

With the advent of spring thaws, you will need Cleveland Paving Breakers for emergency calls and hurry-up repair work.

Model C7 is best for the average job. It is an 80 lb. slugger, easy to hold. Two C7's can be run from a Number 85 compressor. For heavier work, try the C9, which is two pounds heavier but uses no more air. It is designed for breaking the hardest, reinforced concrete. For lighter work, trimming, etc., use the smaller C10, three of which operate from a Number 85 compressor.

Also be sure to select the proper chisels, moils, etc., from the "Clevaloy" line illustrated here. Bulletin 128 tells all about these Cleveland tools, and also contains many valuable hints on getting better service from your paving breakers . . . *Write for it!*

**LEADERS IN DRILLING EQUIPMENT**

**THE CLEVELAND  
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Chicago, Ill.	Ironwood, Mich.	Pittsburgh, Pa.	Washington, D. C.
Cincinnati, Ohio	Lexington, Ky.	Richmond, Va.	

#### CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 71-73



on farms or woodlands at an almost irresistible pace.

Unless Kudzu vines are controlled by moderate maintenance, they will cover all adjacent spaces, including trees, shrubs, fences, grass and land. The only way to control them is to cut them back to the locality where they are needed. Crowns in excess of those that are necessary should be dug. This is not an endless job but one that will take a good deal of time during several seasons of growth. The use of a mower helps if the places are accessible to this equipment.

To stress my point, Kudzu will control serious erosion, but its use should be limited to those areas where other methods are not satisfactory.

### To Conserve Ohio's Water Supply

Ohio's water supply, both surface and ground, is becoming inadequate and also is being polluted, and in 1941 the legislature appointed a committee to find a remedy. This committee has recently reported, urging that funds and authority be provided to establish conservancy districts, the limits of which would be determined by natural valleys rather than political boundaries; which districts would provide for storage and flood control. It also states that the groundwater is being contaminated by careless oil and gas drilling practices and the use of old wells for disposing of refuse and sewage, and "the law should provide that the driller must have a permit and a properly constituted board should have the power to approve or reject such a permit with suitable penalties for violations."

### Wartime Maintenance of Vermont Highways

(Continued from page 16)

of course is expensive. Many towns in Vermont cannot afford to buy it, and in a good many cases would not have enough work of their own to warrant the large expenditure.

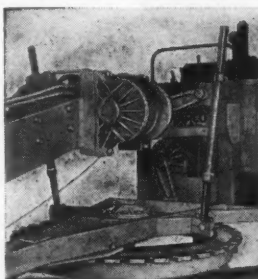
"After the war the State Highway Department hopes to install in each of its districts several power shovels, bulldozers and power graders. These will be available to towns at a minimum rental charge for work on their State Aid and Town Highways. No town can afford not to make use of such equipment.

### Winter Maintenance

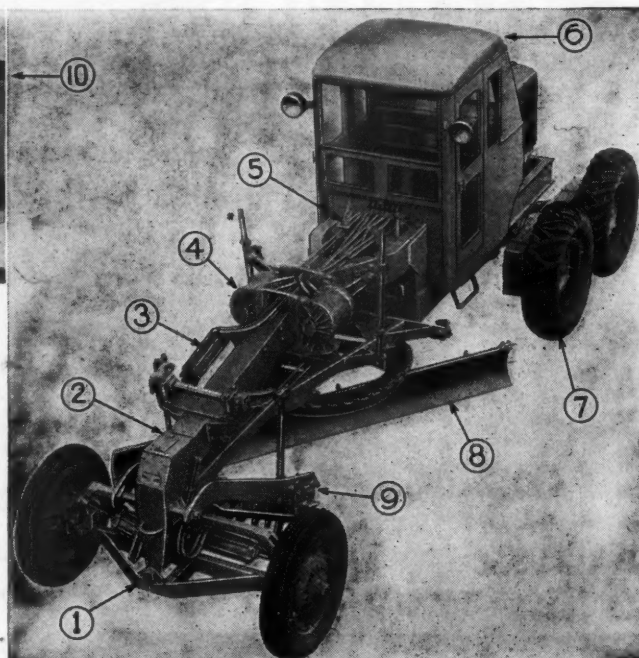
"Beginning the winter of 1942-43 with considerable uncertainty as to future revenue, as well as being faced with the unavailability of new equipment and repair parts, winter operations were reduced to a minimum. This policy could not be continued, and a return was made to winter maintenance on as nearly a pre-war status as possible. During the winter 1943-44 more state money was spent maintaining both the State System and the State Aid System than in any previous winter.

"Winter highway travel is increasing to the point where we can foresee that within a few years after the war there will be no great difference between summer and winter traffic. Even winter recreational travel is markedly growing. And to serve this traffic our highways must be kept as nearly as possible in summer condition the year-round."

## TAKE A LOOK AT A WARCO HYDRAULIC CONTROL MOTOR GRADER



1. Heavily reinforced solid steel bar front axle is steady driving.
2. Rugged, single-member frame of welded construction.
3. Hydraulic Ram controls scarifier or snow plow.
4. Four simple Hydromotors operate heavy blade from operator's station, with easy control.
5. Hydraulic lines in orderly arrangement and thoroughly accessible.
6. Deluxe steel cab. Full, clear vision through safety glass. Insulated roof.
7. WARCO Tandem has chain drive. Hydraulic brakes on two or four wheels. Parking brake on transmission.
8. Heavy moldboard is adjustably mounted and operable in either direction of travel. Blade stays in position where operator wants it.
9. Husky V-Type Scarifier. Teeth individually removable.
10. Four Hydromotors operate by oil pressure with smooth, sensitive rotary action, for placing blade in any practical position.



Warco Model VD-140 Heavy Motor Grader

HERCULES ROLLERS • LIGHT MAINTAINERS • HYDRAULIC  
SCOOPS • MULTIPLE BLADE MAINTAINERS • TERRACING  
GRADERS • ROTARY SCRAPERS

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# You won't find **GENERAL EXCAVATOR** listed in the Mortality Tables!



**EVERY GENERAL BUILT SINCE 1927, ON WHICH THERE IS A RECORD, IS STILL AT WORK!**

**It's a fact!** Every General Excavator built during the past 18 years, on which we are able to check, is still in action: doing a good day's work every day. Our records cover 98% of all Generals

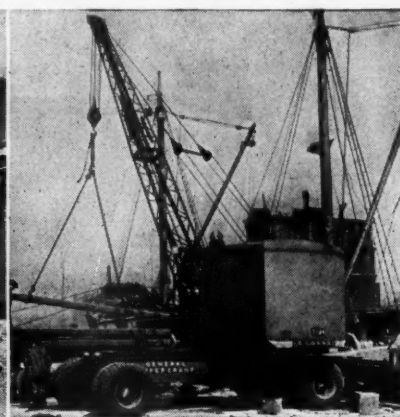
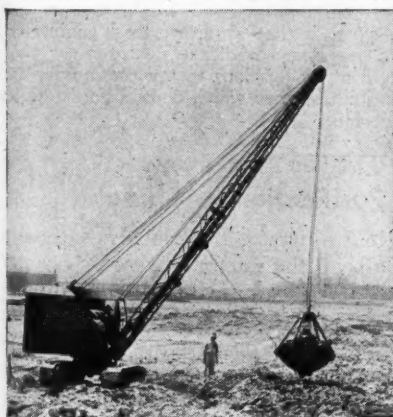
manufactured; the other machines are those sold by their original owners and on which we do not have recent information.

That's the kind of a performance record that has built confidence in General Excavators and Super-cranes . . . confidence that will mean even more Generals at work during the postwar era. Include General in *your* postwar equipment plans! Get all the facts about the complete General line and be sure to inquire about the revolutionary new . . .

## **GENERAL TYPE 10**

Combination Crane, Shovel, Dragline and Backhoe—One Man Controlled—One Engine Operated—On Rubber Tires

**POSTWAR PRIORITY ORDERS  
NOW BEING BOOKED**



BUY MORE WAR BONDS—KEEP THE BONDS YOU BUY

THE  
**OSGOOD**  
COMPANY  
SHOVELS, DRAGLINES  
CRANES  
CRAWLER & WHEEL MOUNTS  
DIESEL, OIL, GAS, ELECTRIC

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**GENERAL**  
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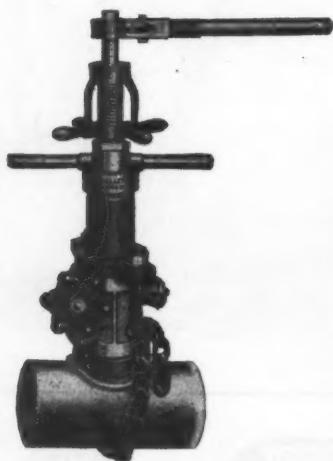
**CRANES, DRAGLINES  
AND SHOVELS**

When you need special information—consult the classified READER'S SERVICE DEPT., pages 71-73



## HOW TO MAKE YOUR "B" MACHINE LAST LONGER

"I've been around quite a bit. There ain't nothing like a MUELLER "B" Machine for tapping and drilling holes in mains or inserting and taking out corporation stops under pressure. They are so danged popular, I guess at least 95% of the water works must use 'em. They can take a lot of punishment and year round use, but when they are thrown around or handled careless like by green hands they wear out just like any other tool. New ones ain't so easy to get right now so I figure it's smart to take care of our machines. Here are the rules we use. . . Oil thoroughly all parts before using. Put plenty of MUELLER Cutting Grease on drills and fill flutes of taps before using. Don't feed drill too fast. Don't let machine lay around for hours to rust. Right after using, clean out all chips and grease. If you let 'em cake up only the body cleaning chisel will get 'em out. Wipe boring bar clean its entire length and oil thoroughly. Oil feed collar. Keep by-pass open. After machine is clean and washed, wipe all surfaces, especially steel parts, with an oiled rag. Keep every piece in its place in the box—well oiled, and keep box away from moisture."



**"B"  
DRILLING  
AND  
TAPPING  
MACHINE**



**"BUY  
BONDS"**

**MUELLER CO.** FOUNDED 1857  
DECATUR 70, ILL. LOS ANGELES 23, CALIF.

When writing, we will appreciate your mentioning PUBLIC WORKS

## The Waterworks Engineers' Code of Practice

The Board of Directors of the American Water Works Association has adopted the following as the official A.W.W.A. "Code of Practice for Members."

As one engaged in providing public water supply for the people that I serve and as a member of the American Water Works Association, I hold to these principles:

I. To the best of my ability I shall conduct all operations under my control in such manner as will, as far as the means made available permit, provide adequate water service, preserve the public health and furnish protection to property.

II. I shall consider that in performing this service I am required at all times to act within the bounds of local, state and national law and within the field of orderly procedure among free men.

III. I shall, therefore, extend my own fund of technical and professional information to the end that the procedures which I advocate are based upon well grounded information.

IV. I shall, in every legitimate manner, encourage the construction of water works structures, the use of materials or the practice of management or operating procedures which are economically sound and in the public interest.

V. I shall at all times discourage exaggerated, unfair or untrue statements concerning any operation or material connected with public water supply. In conformance with this principle, I shall endeavor to assist my associates as well as the public, to obtain a correct understanding of water works operations and materials.

VI. I shall not accept any remuneration or benefit from any interested party other than my employer or my client. Neither shall I accept any collateral employment which might in any degree affect my performance of my duties or obligations to my regular employer or client.

VII. If I have a financial or personal interest in inventions, apparatus or any device or procedure which may be offered for sale to or considered for purchase by my employer or my client, I will disclose that interest to him fully and will participate in no decision related to its purchase or use by that employer or client.

VIII. I hold to the opinion that honorable competition for advancement and for opportunity to render more responsible service is an essential part of democratic civilization—upon which rests real improvement and progress. But I shall not permit my own ambition for advancement to cause me to act unfairly toward others associated with me.

IX. I shall by all legitimate and reasonable means strive to improve the public appreciation of the services rendered by myself and my associates—to the end that employment in the public water supply field is recognized by all as a legitimate and lifetime career for well trained and industrious citizens.

X. I shall not, as an incident related to discussions of rates of pay or conditions of employment, suspend or fail to perform the duties entrusted to me, nor permit water service to fail the citizens who depend on me. I shall, having associated myself with public water supply operations, hold the public interest superior to my personal interests and I shall by my acts and by my leadership see to it that water service is maintained under both normal and emergency conditions.

In short, I understand my obligations to my community and having accepted responsibilities upon which depend public health and safety, I shall not fail.

## Water Purification in China

Water supplies in China are notoriously bad with regard to almost all of the factors by which water supplies are judged. Water has been boiled before use, but because of the universal employment of coolies for handling the water, recontamination usually occurs before the water is used.

A number of the new diatomaceous earth filters, developed by the Corps of Engineers, Ft. Belvoir Laboratory, in cooperation with the Sanitary Engineering Division of the Preventive Medicine Service, Surgeon General's Office, have been flown to China and installed by Capt. C. W. Bovee, Sn.C., at a number of A.T.C. stations. Reports on the operation of these units indicate that excellent results are being obtained. Water is normally being produced that has a turbidity less than 1.0; ameba cysts are removed; after filtration, the water is chlorinated. In most places,



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If your community owns its water supply system and installs pipe bearing a mark like this, you and your fellow taxpayers should be gratified because that mark identifies cast iron pipe, known as "Public Tax Saver No. 1."

**CAST IRON PIPE**  
SERVES FOR CENTURIES



like this in  
stencilled on the pipe  
this  
CAST IRON  
Public Tax Saver No. 1."

**CAST IRON PIPE**  
SERVES FOR CENTURIES

Reproductions of advertisements  
(shown in reduced size) appearing in  
TIME and NATION'S BUSINESS.



it will stay on the job  
the ground for 100 years, serving  
n's water supply  
t bears this mark  
which identifies cast iron pipe, other-  
wise known as Public Tax Saver No. 1.

**CAST IRON PIPE**  
SERVES FOR CENTURIES

## SO MERIT SHALL BE RECOGNIZED

Because cast iron pipe is used so extensively in the public service—for water, sewer and gas mains—the members of Cast Iron Pipe Research Association identify their product to the public by the "Q-Check" mark stencilled on each length of pipe. Cast iron pipe has been advertised to the public for more than twenty years and is becoming widely known as "Public Tax Saver No. 1." Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3, Illinois.



# CAST IRON PIPE

SERVES FOR  
CENTURIES

## Streamlined *INSIDE* for Higher Efficiency and Lower Operating Costs

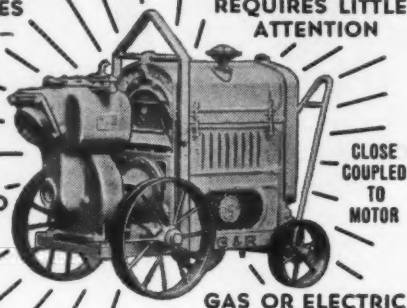
RUGGED SIMPLICITY OF  
DESIGN ELIMINATES  
RECIRCULATION -

NEVER LOSES PRIME  
REQUIRES LITTLE  
ATTENTION

DELIVERS  
GREATER VOLUME  
PER GAL. OF GAS

NO ORIFICE OR  
PRIMING VALVES TO  
CLOG OR JAM

CAPACITIES UP TO  
125,000 GPH



CLOSE  
COUPLED  
TO  
MOTOR

GAS OR ELECTRIC

Streamlined where it counts, you can't clog a Gorman-Rupp Self-Priming Pump. Unequaled in rugged efficiency, gallonage or continuous hours. A size and type for every need.



THE GORMAN-RUPP COMPANY, MANSFIELD, O

# GORMAN-RUPP

SELF-PRIMING CENTRIFUGAL PUMPS



## CUT MAINTENANCE COSTS 75%

Concrete slab maintenance costs can be reduced as much as 75% by the Koehring Mud-Jack Method. The Mud-Jack raises sunken concrete walks, curbs and gutters, driveways, streets, and airport runways eliminating reconstruction costs. Write for the new Mud-Jack Bulletin which is both illustrative and descriptive.



**KOEHRING COMPANY**  
Milwaukee, Wisconsin

## MUD-JACK METHOD

When writing, we will appreciate your mentioning PUBLIC WORKS

a simple tank and piping system have been installed so that water is delivered under pressure to mess halls; provision is made for filling canteens and Lyster bags. In most of these installations, the water is coagulated and settled before filtering, as this greatly lengthens filter runs and saves diatomaceous earth. Both aluminum sulfate and lime (or soda ash) are available in China. The standard portable sand filter can produce good water with coagulation and settling, but unfortunately these procedures are seldom employed.

From the Sanitary Engineering Division, Surgeon General's Office.

## Roadside Development in Minnesota

In his 1944 report, M. J. Hoffmann, Commissioner of Highways of Minnesota, said, under the heading "Roadside Development": "Landscape design is having a marked effect on all grading projects which have been designed during recent years. These plans now include the streamline cross-section, the conservation of existing tree growth and plant material on highway right-of-way beyond construction limits, together with the conservation of topsoil and the replacing of same on areas disturbed by grading operations. Sharp slopes and ditch gradients are being sodded and plant material is being installed in various areas to control erosion and for ground cover and also landscaping.

"Landscape design is also given consideration in the original location and alignment of new construction projects to obtain a closer adaptation of the roadway to the natural topography, and to take advantage of existing natural features."

During the past biennium 2,940 acres of right of way disturbed by grading operations have been seeded to ground cover consisting of the following seed formula:

- 15 lbs. Alfalfa (Northern Grown, not common)  
or Medium Red Clover
- 13 lbs. Brome Grass
- 32 lbs. Winter Rye Grain (for fall),  
Oats (for spring)

The seed is sown at a rate of 60 pounds to the acre. This grass is an excellent forage crop, and when sown along the open road the abutting farmer is usually glad to crop same, thereby saving the state a great deal of maintenance expense of mowing the roadsides.

In the metropolitan areas, 1,169 acres of right of way were seeded to the following grass seed formula at the rate of 120 pounds to the acre:

- 66 lbs. Kentucky Blue Grass
- 24 lbs. Red Top
- 6 lbs. Alsike Clover
- 6 lbs. Brome Grass
- 18 lbs. Winter Rye Grain (for fall),  
Oats (for spring)

This mixture forms a dense permanent sod which is an excellent ground cover and erosion control factor and also adds greatly to the appearance of the roadsides.

Typical features of roadside development projects programmed and completed within the past biennium consisted of flattening of shoulder and back-slopes, and providing of ground cover thereon, through seeding, sodding or planting; the elimination of old construction scars along the trunk highways; the construction of roadside parking areas; the construction of overlooks to take advantage of panoramic views; the landscaping of bridge approaches and the approaches into cities and towns; reforestation of areas disturbed by



# Galvanized CORRUGATED Culvert Pipe

*The Products Are:*

**Copper Steel Corrugated Culvert Pipe  
Pure Iron Corrugated Culvert Pipe  
Catch Basins, Down Spouts  
Manhole Plate Covers**

**Asphalt Coated Corrugated Culvert Pipe  
Paved Invert Corrugated Culvert Pipe  
Half Circle Deck Drains  
Arch Pipe, etc.**

*(Not available until our wartime obligations are fulfilled)*

**All Young & Greenawalt drainage products are made from internationally known U.S.S. Pure Iron and U.S.S. Copper Steel Sheets manufactured for us by Carnegie-Illinois Steel Corporation.**



*Pipe being used by Armed Forces under an air strip in the South West Pacific to carry off the tremendous volume of water from tropical rains.*

## YOUNG & GREENAWALT

**Engineers • Contractors • Manufacturers**

**332 S. MICHIGAN AVENUE**

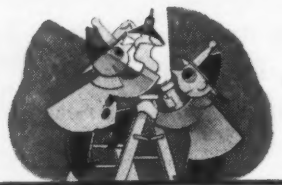
**CHICAGO 4, ILLINOIS**

grading operations; the perpetuation of historic markers and the elimination of traffic hazards, by placing existing markers back from the roadway and providing suitable turnouts which permits the public to park off of the highway while reading the legends.

### Manpower Saving for Waterworks

The Secretary of the American Water Works Association, in a recent bulletin, cites "case histories of manpower saving" in the gas industry which may offer suggestions for waterworks superintendents. Some of these are as follows:

The use of a power driven machine (costs \$1,000) to bore horizontal holes under the paved streets and railroads through which pipe is installed, has reduced necessary manpower from 15 to 4.



### OUT LIKE A LIGHT!

A Mathews hydrant that needs fixing comes out of the ground like a light-bulb from its socket. Just give the hydrant a few turns. It unscrews and is ready for a trip to the shop. In its place goes a spare that screws into position just as easily. You never have to dig to fix a properly set Mathews hydrant, never have to make emergency, on-the-spot repairs. When work-crews have time on their hands, they can service the hydrant in the shop. The Mathews barrel contains all working-parts, including main and drain valve-seats. It unscrews from the elbow and lifts out through the loose protection-case. For vital fire protection, and important maintenance economies, specify Mathews protection for your community!



## MATHEWS HYDRANTS

Made by **R. D. WOOD Company**

400 CHESTNUT STREET, PHILADELPHIA 3, PA.

MANUFACTURERS OF SAND  
SPIN PIPE (CENTRIFUGALLY  
CAST IN SAND MOLDS) AND  
R. D. WOOD GATE VALVES

The use of gasoline-operated hammers for digging through street pavements for small laying and relaying jobs saves the necessity of sending out an air compressor unit.

Installing gas service in trench 8 inches wide, a long handle schovel with a special blade is used in making a trench 8 inches wide across the entire width of the street. The pipe is coupled together on the roadbed, lowered into the trench where it is connected to the main and the trench back-filled. While no saving is made in company labor, a saving of manpower in repaving of streets by reason of having smaller amount of pavement open is accomplished.

Installing services with Little Giant Pusher. In this operation the new service pipe is connected to the end of the existing pipe to be replaced and with the Little Giant Pusher the pipe is pulled through the earth to make connection at main. This method is very effective in reducing the amount of pavement disturbed.

One company has recently started the practice of boring under paved areas for service installation and some 2-inch main extensions. This device uses an air-drill for turning the  $\frac{3}{4}$  inch pipe which is used as a drill rod. A bit with 2 small holes drilled on each side is attached to the end of the pipe and water is injected at city pressure. After the bit cuts its way through the dirt, the water washes out the spoil. The bit sizes can be varied to give holes ranging in size from 1 to  $2\frac{3}{4}$  inches. At a cost of \$350 it is estimated that a saving of 8 man hours per street drilling will be saved.

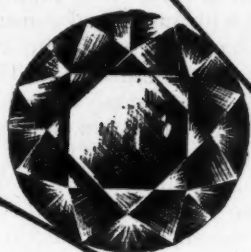
An air wrench was installed for the dismantling of valves and other equipment requiring wrenches, at a cost of \$250. With the use of the air wrench, the ratio of the equipment to manpower is about 9 to 1.

A plan of pre-routing orders to field men has made it possible to use fewer trucks, less manpower and eliminate considerable mileage. In the pre-routing plan now used with success, the dispatcher sets up the orders for the field men the day before they are to execute them. The dispatcher works with a large map, inserting a pin in the map at the address of each order to be handled the following day. When all orders have been identified with pins, the dispatcher takes a length of string and runs it from pin to pin until he has arrived at the most direct and mileage-saving route by which the field man can travel from one address to another.

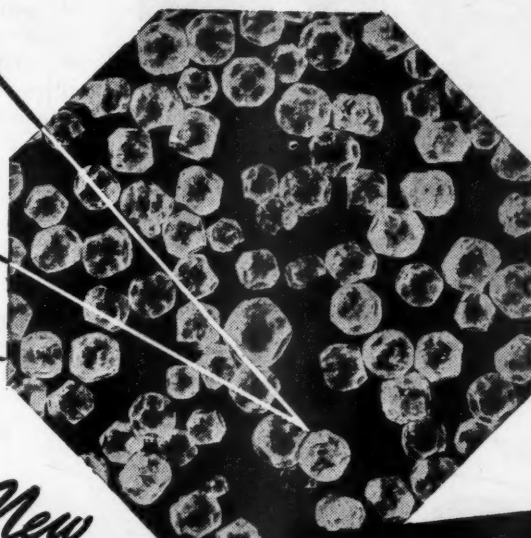
### Charges for Outside Water Service

A survey of the practices of Michigan cities having populations over 10,000 in supplying water service outside the city limits, made by the Michigan Municipal League, reveals





# Diamonds...? NO!



Potash Alum Crystals: 5 diameters

## The New STANDARD GRADE CRYSTAL ALUMS\*

### by General Chemical

#### For WATER COAGULATION Standard Grade LUMP

of same high chemical quality as rice and granular sizes. Especially for use in water plants employing "solution pot" feeders.

The searching eye of the photomicroscope finds gem-like form and brilliance in General Chemical's new Standard Grade Ammonia and Potash Alums. . . . Examine this unretouched enlargement. Note the *unusually uniform size, shape and complete formation* of the crystals. Here are superior physical characteristics which make these General Chemical Crystal Alums outstanding for many industrial operations. They are free flowing without dusts or fines . . . have faster, more

uniform rates of solution . . . handle better in conveying equipment and feeding systems.

In addition to visual perfection, the chemical purity built into these alums is held to standards comparable to fine chemical specifications—without increased cost to consumer. The new processing techniques yielding this superior quality are another achievement of General Chemical's continuous research and development of Basic Chemicals for American Industry.

#### CRYSTAL ALUM, AMMONIUM

- ★ Rice, thru 8 on 30 Mesh
- ★ Granular, thru 10 on 60 Mesh

#### CRYSTAL ALUM, POTASSIUM

- ★ Rice, thru 10 on 30 Mesh
- ★ Granular, thru 30 on 60 Mesh

And In New Containers: Fiber Drums, net wt. 360 and 100 lbs.  
Multiwall Paper Bags, net wt. 100 lbs.

Standard Grade Lump and Powdered sizes have same high chemical quality.

U.S.P. GRADE: Conforming to requirements of pharmacopeia in all respects . . . available in all sizes.

BASIC CHEMICALS



FOR AMERICAN INDUSTRY

#### GENERAL CHEMICAL COMPANY 40 Rector Street, New York 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) • San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

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Montreal • Toronto • Vancouver



Look for the name

**LE ROI**

on the power unit of the  
equipment you buy . . .

it means dependable power

Men responsible for the operation of equipment know that Le Roi engines perform dependably and economically, and can take the punishment handed out to field equipment. The greatest reason underlying this dependability is the fact that Le Roi engines are built by a manufacturer concentrating exclusively on the problems of the heavy-duty field. These engines have the weight and stamina to stand up under all types of service.

When you specify "Le Roi" power, your recommendation is backed by more than a quarter century of experience in the specialized power requirements of your particular field.

*Write for complete information.*



**Le Roi Company**

1770 S. 68th Street • Milwaukee 14, Wisconsin

**ENGINES • ENGINE-GENERATORS  
PORTABLE AIR COMPRESSORS**

*When writing, we will appreciate your mentioning PUBLIC WORKS*

that all except seven of these cities supply such service on a contract basis with individual consumers. Detroit and Port Huron generally enter into contracts with townships rather than with individuals. The water rates for outside service are the same as inside the city in six cities: Adrian, Iron Mountain, Ironwood, Jackson, Menominee, and Traverse City. Thirteen other cities charge outside ranging up to one and one-half times the inside rate. The outside water rates for six other cities range from one and two-thirds up to double the rate within the city: Ann Arbor, Bay City, Birmingham, Ferndale, Monroe, and Port Huron. Detroit adds only 5 per cent to the inside rate if the contract is with a governmental body and service is controlled by a master meter.

## Chlorine Dioxide in Potable Water Treatment

By JOHN F. SYNAN, J. D. MacMAHON  
and G. P. VINCENT

The Mathieson Alkali Works, Inc.

**W**HILE the use of chlorine as a disinfecting agent is extremely effective in making water potable, it is not always satisfactory where there are taste and odor problems. This is especially true where industrial wastes cause a "chlorphenol" taste or where algae are present.

"Breakpoint" chlorination has been beneficial in water treatment since it gives greater assurance of safe water to the plant operator than does ordinary chlorination. Although "breakpoint" chlorination has often reduced tastes and odors existing in water supplies, the reduction is frequently insufficient to accomplish palatability.

Complete palatability is obtained by a new method of water treatment which makes use of chlorine dioxide, produced in the water purification plant, as required, by the reaction of chlorine with a solution of sodium chlorite:



The method of treatment was developed as a result of experiments on the water supply of the City of Niagara Falls, where serious taste and odor difficulties were aggravated by considerable fluctuation in pollution. The procedure consists of pretreatment with chlorine for disinfection followed by treatment with chlorine dioxide to destroy tastes and odors. Chlorine dioxide has two and a half times the oxidizing power of chlorine, in terms of available chlorine.

This method of water treatment is now used for the entire water supply of the City of Niagara Falls.

Enough chlorine is introduced during the pretreatment to maintain a residual available chlorine of 0.4 to 0.5 ppm in the settling basin and 0.2 ppm under the filters. This residual may be regulated in the usual manner, by the addition of carbon, or it may be maintained simply by regulating the chlorine feed. A dosage of 1.5 ppm chlorine is ordinarily sufficient for the purpose, but is increased when the demand of the water increases.

Alum is added for clarification, usually 17 ppm being sufficient, and the water is held in the settling basin for three hours.

Following this treatment, chlorine dioxide is introduced at the clear well. As chlorine dioxide is too



*Back again!*

## BRONZE CASES

for  
**Worthington-Gamon  
Meters**

*...but Present Government  
Regulations Limit Use  
to Small Meters*



**W**AR Production Board Limitation Order L-154 has been amended to permit the allocation of a limited amount of copper to the manufacture of bronze cases for water meters. Bronze will be used for Worthington-Gamon meter cases in  $\frac{5}{8}$ " to 1" sizes only.

**"Watch Dog" Quality Based on Longest Experience,  
Largest Research Facilities**

The oldest water meter manufacturer, Worthington has constantly improved its broad line, to minimize maintenance, and at the same time measure ever smaller quantities dependably, accurately.

### The Most Extensive Nation-Wide Service

Another reason why Worthington-Gamon Meters have been specified in the largest U. S. contracts: 24 district offices in 24 leading cities.

### WORTHINGTON-GAMON METER COMPANY

282-296 South Street, Newark, New Jersey

WG-4

Subsidiary of  
**WORTHINGTON PUMP AND MACHINERY CORPORATION**



Power Plant Equipment • Turbines & Turbine-Generator Sets • Condensers, Heaters, Ejectors • Water Purification Equipment • Pumps, Stationary and Portable Compressors • Air Conditioning & Refrigerating Equipment • Power Transmission Equipment • Construction Machinery, Equipment for Mines • Locomotive Feedwater Heaters • Welding Positioning Equipment • Liquid Meters

WATCH DOG



WATER METERS

**The  
Meter Specified  
in the  
Largest Contracts  
Ever Awarded  
in the U. S.**



"Watch Dog" models... made in standard capacities from 20 GPM up; frostproof or split case in household sizes. All parts interchangeable with your present meters of our manufacture. Write for Bulletin.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 71-73

# McWANE PRECALKED



ALL SIZES  
2" THRU 12"

**No SKILLED LABOR  
NO LEAD MELTING & POURING**

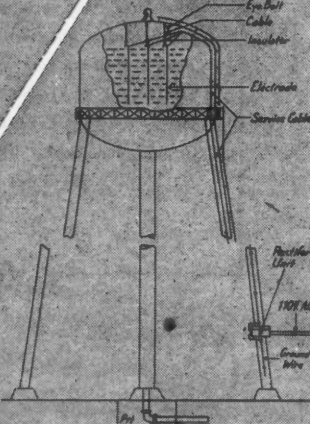
Sidestep these . . . and you practically HALVE installation time and costs. McWane PRECALKED pipe means less men . . . less materials . . . less time. A BIG saving! It also means corrosion-resisting pipe. No leaks! Write.

McWane Cast Iron Pipe Co., Birmingham 2, Ala.

## McWane PRECALKED Pipe

### STOPS TANK RUSTING *Below the Water Line* PERMANENTLY!

Rust below the water line is by far the most troublesome, expensive and destructive item of tank maintenance. But it can be eliminated completely—permanently. A proven electrolytic system (Cathodic Protection), carefully engineered to meet individual conditions, stops all rust formation—even removes old rust. Installed without draining the tank. Costs pennies to operate. Safe, low voltage. No paint, no chemicals. And no more rust, no more scraping or painting. Applicable to many types of submerged metal equipment. Method approved by Associated Factory Mutual Laboratories, War Department (Chief Engineer's Office) and American Water Works Assn. Write for facts—NOW.



**ELECTRO RUST-PROOFING**

*Corporation*

DAYTON 10, OHIO, U. S. A.

When writing, we will appreciate your mentioning PUBLIC WORKS

reactive to ship and store, it must be produced, as needed, at the point of use. For water treatment, the process is as follows:

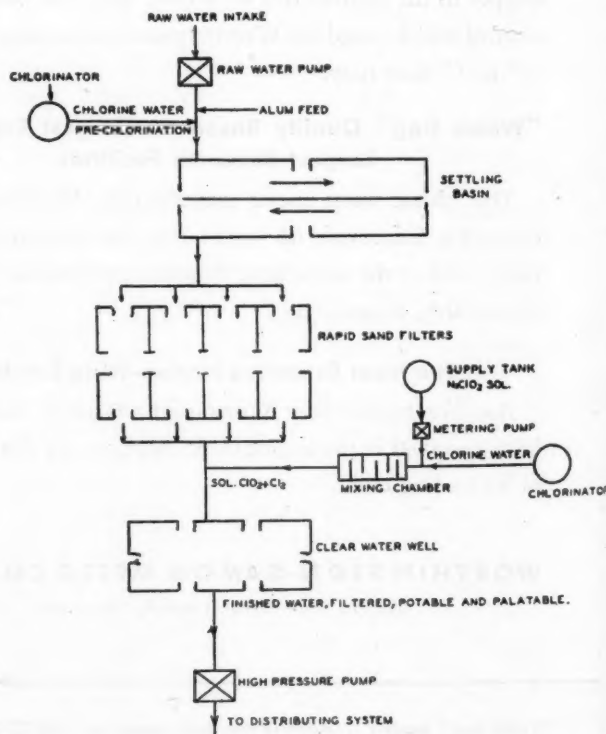
A sodium chlorite solution, containing 31 grams per liter of available chlorine (23.7 grams per liter of sodium chlorite), is fed by means of a metering pump into the discharge line of a Wallace and Tiernan chlorinator, at the rate of 1.65 gallons of solution, or 0.42 pound available chlorine, per hour. The chlorinator is set to deliver two pounds of chlorine per million gallons, equivalent to 0.25 pound of chlorine per hour, at a pumping rate of three million gallons per day.

To assure complete conversion of sodium chlorite to chlorine dioxide, an excess of chlorine is used, and the reaction mixture is passed through a mixing chamber before entering the well. The chlorine dioxide is maintained at a value of 0.5 to 0.75 ppm available chlorine.

The equipment used at Niagara Falls for this water treatment method includes two Wallace and Tiernan chlorinators. One is for prechlorination. The other feeds into a U-shaped glass mixing chamber, into which the sodium chlorite solution is also fed by means of a metering pump, thus forming a chlorine dioxide solution.

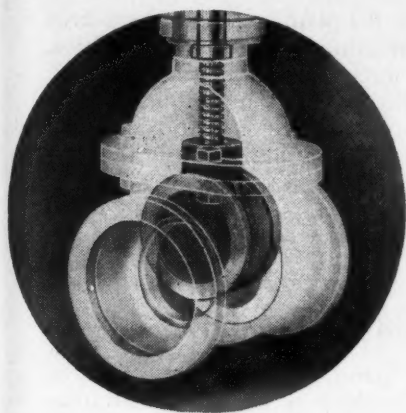
The effectiveness of the new method of treatment in removing tastes and odors, as compared with chlorination alone, is indicated by the following table of results of laboratory experiments. These experiments were run on raw water, taken from the Niagara River, treated with 17 ppm alum, settled for two hours and filtered. Phenol was added, where indicated, then chlorine, or chlorine dioxide, or the former followed by the latter. The taste of the resulting samples, after standing overnight, was evaluated by five judges, whose findings were recorded by the following "code":

No chlorphenol . . . . .	O
Slight chlorphenol . . . . .	X
Bad chlorphenol . . . . .	XX
Very bad chlorphenol . . . . .	XXX



Flow sheet showing chlorine dioxide treatment for removal of tastes and odors.

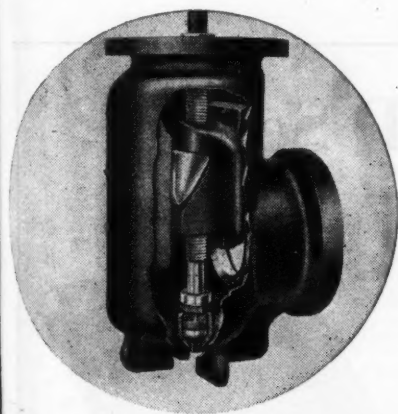




## LUDLOW DOUBLE DISC GATE VALVES

The parallel seat, double wedge type slide gate valve, developed and perfected by Ludlow, provides a number of essential benefits. For instance:

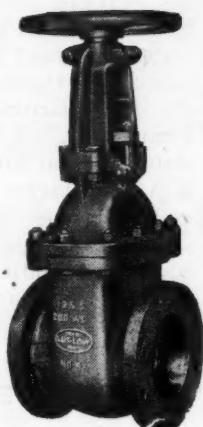
- **Smooth, Positive Operation.** Gates positioned directly opposite ports before wedging, and entirely unwedged before being raised.
- **Positive Closure**—even after years of service in the open position; flexible-action gates self-adjusting to seats.
- **Self-Cleaning.** Rings cleaned throughout entire stroke. No internal guides to cause foul-up.
- **Ready Replacement of Parts.** Simple construction with ample tolerances, permitting ready replacement of parts.



## LUDLOW FIRE HYDRANTS

Distinctive List 90. Design now serving in thousands of cities and towns. No Ludlow Fire Hydrant has ever failed in line of duty! Employs famous Slide Gate Feature and offers the following advantages:

- **Quick Water** with least possible shock. Proper shut-off without water hammer.
- **Proper Drainage.** Hydrant automatically drained at lowest point when closed.
- **No Flooding.** Accidental breaking of the hydrant, such as might result by collision from a heavy truck, will not cause flood since the gate when closed is wedge-locked.
- **Easy Inspection and Servicing** without unscrewing anything below the ground level. All working parts removed as one unit by lifting stem through top of hydrant.



Outside Screw and Yoke Type



A.W.W.A. Double Disc Gate Valve

←Iron body, bronze mounted—low pressure valves. List 3 Valves made in sizes 2" to 48" and can be furnished with Hub, Flanged, Universal, Spigot, and Screwed Ends.

Valve shown with Hub Ends and without gearing. Also available with gearing or outside screw and yoke—and flanged ends.

←Hydraulic Cylinder. iron body, bronze mounted—manufactured in all sizes for any desired test or working pressures. Can be operated by four-way cocks or remotely controlled by solenoid valves.

(Flanged End Standard Gate Valve with Cast Iron Bronze Lined Hydraulic Cylinder)

# LUDLOW EQUIPMENT

## *Proved by the Past—Fit for the Future*

In the last analysis, the best indication of future service in water works equipment is its past record. Through the years—changing systems, higher pressures, lower budgets, wartime emergency—Ludlow Valves, Gates and Hydrants have served efficiently and faithfully. You may continue to rely on them for constant service, low upkeep, resistance to wear and fewer replacements. You may rely, too, on Ludlow engineers to consider your problems their own, making honest recommendations and giving accurate estimates.

**Write today for full information**

←Iron body, bronze mounted—tested at 350 lbs. hydrostatic pressure. List 44—sizes 2" to 12"—200 lbs. working pressure. List 66—sizes 14" to 48"—150 lbs. working pressure.

Iron body, bronze mounted—complying with latest A.W.W.A. Specifications. Tested at 300 lbs. hydrostatic pressure. Sizes 2" to 48".

*The*  
**LUDLOW**  
SINCE 1866  
**VALVE MFG. CO. INC.**  
TROY · N.Y.

Phenol added (ppm)	Chlorine pre- treatment (ppm)	Chlorine dioxide (ppm available chlorine)	Taste
0	2.5	—	xx
0	5.0	—	xx
0	10.0	—	xx
0	—	1.0	0
0	—	2.5	0
0	—	5.0	0
0.08	1.5	—	xxx
0.08	1.5	0.5	0
0.08	3.0	—	xxx
0.08	3.0	0.5	0

The chlorine pretreatment is used, not because chlorine dioxide is ineffective as a bactericide, but, paradoxically, because it is too active. When tested on *distilled* water to which E. Coli has been added, chlorine dioxide is a better bactericide than chlorine. When added to *polluted* water, however, the chlorine dioxide, because it is much more reactive than chlorine, destroys phenols, algae, and other contaminants at the same time that it attacks bacteria. The disinfection of polluted water therefore requires more chlorine dioxide than chlorine, so that for disinfecting purposes the latter is usually more economical.

The chlorine-chlorine dioxide treatment has given a year-round satisfactory water supply, eliminating the taste of phenol which was characteristic of Niagara water during the winter, and of algae growth, which had caused difficulties during warm weather. Break-point tests in the laboratory indicated that, with the old method, doses of 15 ppm chlorine would have been required in some cases, and on at least one occasion

during the test period, the plant would not have been able to feed enough chlorine to handle the condition, and would have been forced to close down.

In addition to effecting a saving in the cost of treating chemicals, the chlorine-chlorine dioxide treatment eliminates the careful control previously required in chlorination and thus simplifies plant operations.

From *Taste and Odor Control*, monthly organ of the Industrial Chemical Sales Div. of West Virginia Pulp & Paper Co.

### New Standard for Form Plywood

A new commercial standard for plywood for concrete forms has been adopted by the National Bureau of Standards and becomes effective on January 27. Panels will be made in 36" and 48" widths, and in lengths of 5, 6, 7 and 8 ft. There will be two standard thicknesses— $\frac{5}{8}$ " and  $\frac{3}{4}$ ". They shall be made of firm, smoothly cut veneer, free from knots, splits, pitch pockets and other open defects,  $\frac{1}{8}$ " thick before sanding. Streaks, discolorations, sapwood, shims and neatly made patches will be admitted. Panels shall be edge sealed and have the faces mill-oiled unless the order specifically states not to oil. They shall be stamped on the face "Genuine Douglas Fir Plyform Concrete form panel." A test sample 6" x 6" submerged in water at room temperature for 4 hours and then dried at a temperature not to exceed 100° F. for 20 hours, and the same cycle repeated nine additional times, shall not show more than 2" of delamination along the edge. The bonding agent used shall be especially prepared for this purpose and be very highly water-resistant.

## NEW Sewers..or CLEANED Sewers?

Many a city and village is talking about larger sewers or new sewers when all they really need is *cleaned* sewers. The best and most adequate sewer is no good if it is clogged to a fraction of its real capacity. The remedy in that case is not costly new sewers but economically *cleaned* sewers.

And that is where STEWART comes in. Our job is to equip and help American communities to get the full capacity from existing sewers. With the right tools and equipment—backed by STEWART "know how" in manufacture and service—that is neither a difficult nor a costly procedure. Why not take the first step toward sewer satisfaction by using this coupon to get the new helpful STEWART catalog today?



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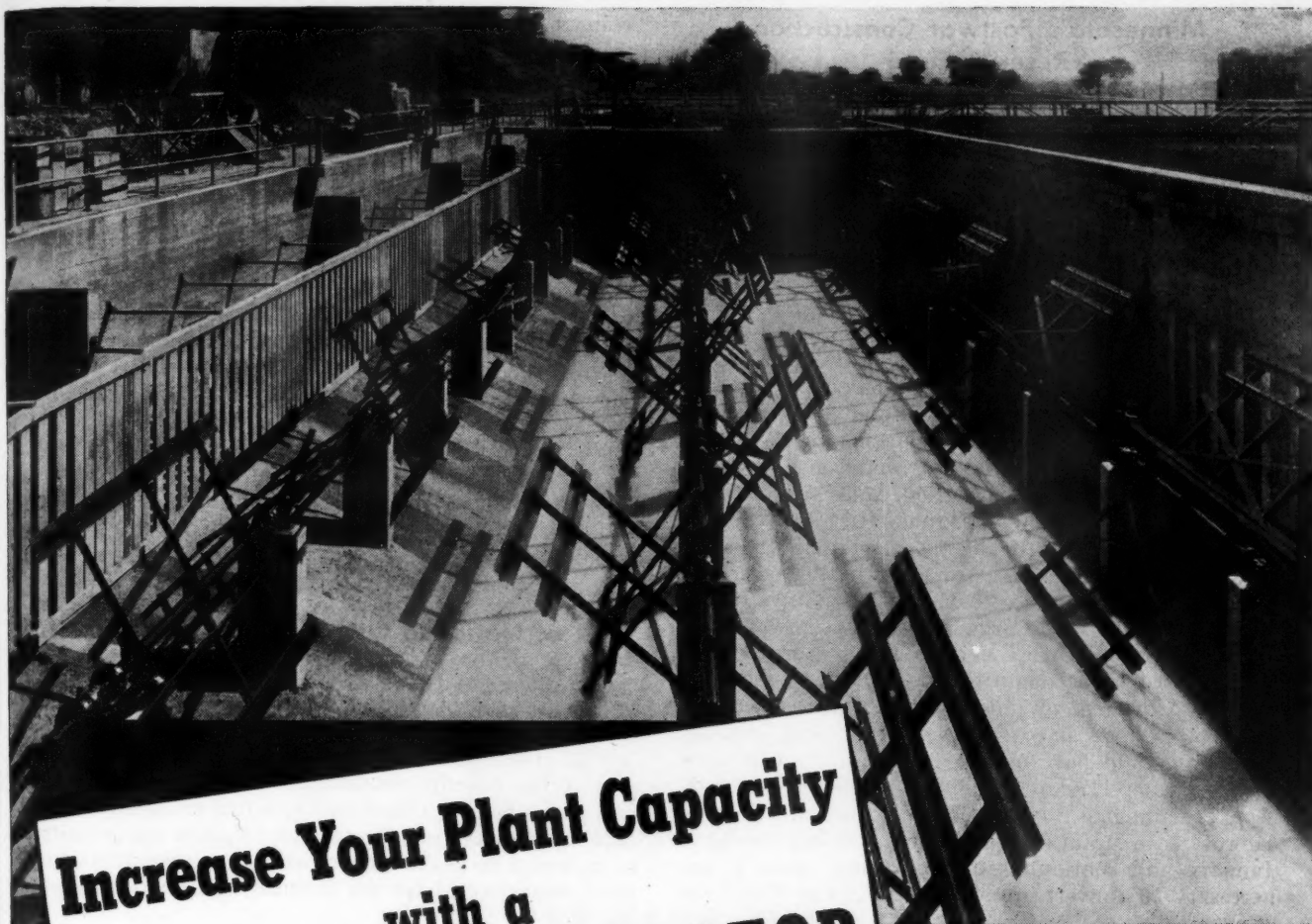
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Flocculators followed by Dorr Clarifiers

**DORRCO Flocculator**-prepared water promotes better clarification in the sedimentation basin—maintains high rates of filtration—longer filter runs—lower wash water consumption and less chemical consumption.

The Dorrco Flocculator not only increases plant capacity, but improves the quality of the water, uses less chemicals and has a low

power consumption. The efficient method of mixing and flocculating produces consistent results and better chemical distribution which leads to better overall economy of water treatment.

The Dorrco Flocculator can be fitted into existing plants at a relatively low cost. Because it utilizes an enclosed dry-well drive, the maintenance expense required with wet-well drives is eliminated.

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### Minnesota's Postwar Construction Reserve Fund

In June 1942 the Minnesota Department of Highways reported that, pursuant to an order by the Governor dated January 6, 1942, there had been established a Postwar Highway Construction Reserve Fund. While previous laws permitted investment of surplus funds in the Trunk Highway Sinking Fund, there was no authority for investment of surplus funds in the Trunk Highway Fund. It was recommended to the 1943 Legislature that such authority be granted. An act was passed early in January 1944 providing that, whenever the Commissioner of Highways shall certify to the State Board of Investment that there is a surplus in the Trunk Highway Fund not currently needed, the Board may invest such sums in U. S. Government bonds or securities, so conditioned as to be convertible into cash when needed. Soon after passage of this act, \$3,500,000 of Trunk Highway Sinking Fund monies and \$10,000,000 of Trunk Highway Fund monies were invested in government securities. From time to time since then, additional investments have been made. Investments of Trunk Highway Sinking Fund monies have usually been for short periods, until needed to pay maturing state highway bonds or interest. If current revenues had continued to decrease in 1944 at the same rate as in 1942 and 1943, it probably would have been necessary to convert some of the Trunk Highway Fund investments into cash, to pay maintenance costs and other current expenses. However, an upturn in gasoline taxes beginning in January and continuing through June, made it unnecessary to convert any Trunk Highway Fund in-

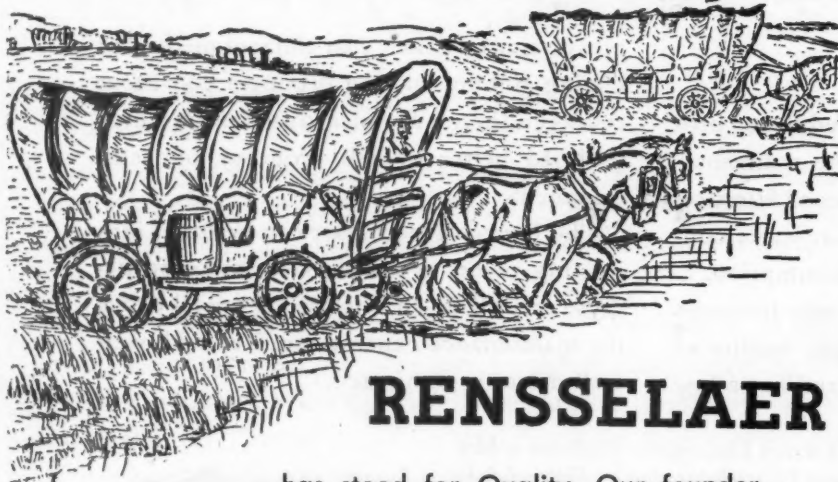
vestments during the biennium. On June 30, 1944, there were \$18,800,000 of State Trunk Highway Funds invested in government securities, in addition to which there was a cash balance of \$1,662,952.83. Against this reserve, however, there were budget encumbrances of \$5,146,287.37, so that the actual reserve was slightly more than \$15,000,000.

It would appear from various bills being considered by Congress that after this war much surplus material will be offered for sale on competitive bids. In such cases the state of Minnesota would be severely handicapped because of existing laws which require advertising for bids. Said Commissioner Hoffmann: "Our recent experience with surplus stocks from WPA has shown that the Government will not submit bids in such cases. I would recommend that a procedure be authorized by which the various state agencies would be authorized to make purchases of surplus war equipment from the Government without advertisement for bids. Similar authority should be granted to the county and local governments."

### Lack of Notice to Owners Invalidates Sewer Assessment

The Wisconsin Supreme Court holds (*Boden v. Town of Lake*, 244 Wis. 215, 12 N. W. 2d 140) that special assessments for public improvements cannot exceed the benefits resulting to the property taxed; and the owner must have notice, actual or constructive, that his property is to be taxed and given opportunity to be heard as to the amount of the assessment. Judgment was directed for the plaintiff in an action to set

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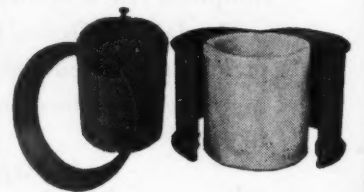
has stood for Quality. Our founder always insisted RENSSELAER Valves and Hydrants must be the best possible to produce. This same policy has been faithfully followed down to the present day.

Ask the man who uses RENSSELAER

**RENSSELAER VALVE CO., TROY, N. Y.**

## STEEL FORMS for CONCRETE METER BOX TILES

You can make excellent meter box barrels at low cost with one of these steel forms. They are made in several sizes and lengths.



Let your post-war plans include making good use of one or more of these forms. Make a start now by asking for information.

**FORD**  
*Meter Box Co.*  
**WABASH, INDIANA**



aside a special tax imposed for sewer construction because the property owners were not given the notice required by the state statute. The only notice given stated that the sewer was to be constructed for the benefit of the whole town instead of for the benefit of abutting property. The assessments were also held invalid because no sewer district was established, no plans were filed showing what lands were affected, and all the tracts were assessed at a flat rate regardless of benefits, contrary to the statutes.

### The "Project Credit Plan"

In his "Weekly Talk to the People" Mayor LaGuardia of New York City, on October 29, 1944 said in part:

"I want to endorse and to tell you about a plan of the United States Plywood Corporation under which it will assist men who want to go into business or establish small plants. They call it the 'Project Credit Plan.'

"The plan is that if a firm or an individual can satisfy the manufacturer that they are of good character, and possess or command skill in the use of plywood products, the Company will aid them in securing contracts from approved customers.

"The assistance takes the form of merchandise advanced to them for the completion of these contracts, and also the advance of money to meet payrolls. The amount of merchandise and cash advanced depend on the soundness of specific projects and of ability to carry them through. Each project must stand on its own feet and is based on a prospective or actual contract requiring the use of plywood products. Repayments are made as the contract is carried along toward completion.

"The manufacturers' engineers and staff will help work out the project to make sure of its soundness and that a profit will accrue to the firm or individual holding the contract.

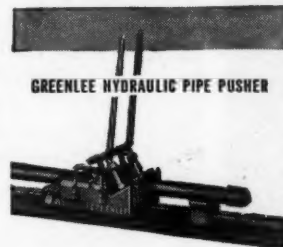
"This is an opportunity especially for returning service men who can get orders or contracts involving the use of plywood products. However, the plan is not confined to veterans, but is open to anyone properly qualified.

"Bankers have described the 'Project Credit Plan' as a very constructive extension of credit by a manufacturer who is best able to judge the ability of the applicant and the soundness of the individual project."

To a certain extent this plan has been used in the contract business



## GREENLEE PUSHER quickly solves tough "under street" piping problems



**POWER**—pushing pressures range from 6,500 to 40,000 pounds.

**EASE**—one or two men can easily develop needed pressure. Hydraulic unit does actual pushing.

**PORTABILITY**—A compact unit, easy to carry to the job and set up.

**SPEED**—operates at 6 different speeds to match varying soil conditions.

**ECONOMY**—eliminates cost of extensive digging, requires fewer man-hours.

**TWO MODELS**—(1) for up to 4-inch pipe; (2) for large drainage ducts, concrete sewer pipe, etc. beyond 4".

Installing new piping under busy Chicago Michigan Avenue could be a mighty difficult assignment with old methods of pipe laying. But not with a GREENLEE Hydraulic Pipe Pusher!

In the case illustrated above, an opening was made in the wall of a hotel sub-basement, and a GREENLEE Pusher made short work of the job of pushing pipe to an opening beyond the far side of the street. No traffic tie-up, no extensive digging, no pavement damage, no tunneling and no back-filling. Think of the time and materials saved. On this and many other types of installations, the GREENLEE Pusher pays for itself first or second time used.

Use a GREENLEE Pusher to install pipe under streets, flooring, tracks, lawns and other obstacles—do the job better, quicker, and at great savings. For complete information and prices write today for free folder S-117. Greenlee Tool Co., Division of Greenlee Bros. & Co., 2044 Columbia Avenue, Rockford, Illinois.



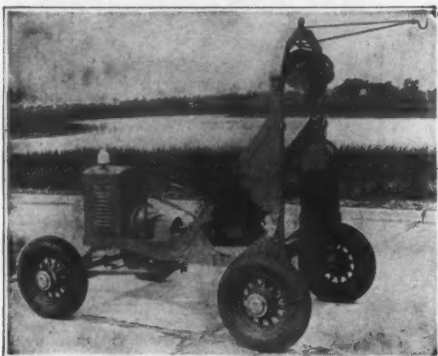
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# KEEP THOSE SEWERS OPEN!



Sewers clogged with sand, roots and other debris are a constant danger to public health and safety. New installations rapidly lose their efficiency due to sand seepage.

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Three Distinctive Models Available. Write Now for Literature.

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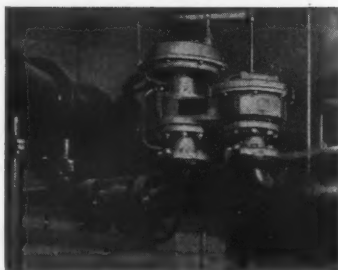
**THE COAGULANT  
THAT CUTS  
COSTS**



Write today for actual case histories  
of water plants now using Ferri-Floc.

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**P.F.T. Flame Traps  
Protect the Sewage  
Treatment Plants  
of Over  
235 War Projects**



In camps and armament plants throughout the nation, the fire and explosion hazards created by sewage gas at the disposal plants are eliminated by P.F.T. Flame Traps. P.F.T. Boiler Room Equipment is preferred.

Write for Bulletin No. 121-A describing P.F.T. Flame Traps, Pressure Relief Valves, Waste Gas Burners, Condensate Drip Traps, Pressure Gages and other boiler room accessories which assure safe operation of digested sewage sludge treatment plants.

**P.F.T. PACIFIC FLUSH-TANK CO.**  
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for many years. Fifty or more years ago sewer pipe manufacturers made a practice of furnishing pipe to promising young contractors for carrying out special jobs if they thought their bids were reasonable, helping them to make up their bids, and even furnishing the bond required to insure performance of the contract, taking payments from what was left of the monthly estimates after the labor had been paid. Competition among the many manufacturers led to laxness in approving contracts and extending the credit to incompetent or dishonest contractors, and the financial losses resulting discouraged continuance of the practice. Intelligently and conservatively conducted, however, the plan should be advantageous both to manufacturers of materials and equipment and to promising men wishing to start in the contracting business along lines in which they have had adequate experience.

## Hazards in Sewage Works Operation

(Continued from page 18)

*Summary of detailed procedure when entering a large or deep sewer or underground structure where dangerous gases or an oxygen deficiency may be present.*

1. Erect warning signs.
2. Allow no smoking or open flames, and guard against sparks.
3. Use only safety gas-proof electric lighting equipment or mirrors.
4. Test the atmosphere for noxious gases and oxygen deficiency.
5. If atmosphere is normal, worker may now enter with safety belt attached and two men available at top. For extended jobs, gas tests should be repeated at frequent intervals depending on circumstances. (For example, a completely emptied digestion tank vented by open manholes would continue to be safe, while one still containing some scum or sludge on the bottom should be repeatedly checked).
6. If gas, or oxygen deficiency is found, atmosphere should be ventilated with pure air by natural or artificial means. A compressed air jet or portable blower are the most practical methods of artificial ventilation. Gas tests should then be repeated and atmosphere cleared as normal before workers enter.

*Adequate ventilation must be maintained during work, and tests frequently repeated.*

7. If gas, or oxygen deficiency is present and it is not practical or possible to ventilate adequately before workers enter (such as in the saving of life), a hose mask should be worn and extreme care taken to avoid all sources of ignition if flammable gas is present. Use "permissible" safety lights (not ordinary flashlights), wear rubbers or non-sparking shoes, use non-sparking tools, etc. *Work that is progressing in flammable gas atmospheres is extremely hazardous and should never be attempted except by those thoroughly familiar with the dangers and fully equipped with the proper protective safety equipment.*

The above outlines the information and recommendations given in the manual. It seems to us desirable that at least one copy of this be placed in every sewage works office, and that every superintendent of sewer maintenance and every plant operator, and all employees with sufficient intelligence to benefit by it, be required to read it. Copies can be had at 25 cts each for



members of the Federation, 50 cts for non-members, by addressing W. H. Wisely, the Secretary, 325 Illinois Bldg., Champaign, Ill.

## Rebuilding a Road on Foundry Dirt

By WALTER A. STONE

Superintendent of Highways, Orange, Mass.

THIS was a small job but was interesting to me because when I started it I did not know how it would turn out. The road (called Mill St.) was originally built of old foundry dirt, including a lot of cast iron chips on turnings. It has been nothing but a mucky mess, and for years the factory owners had been asking the town to fix it. Four concrete sidewalks crossed the road connecting two parts of the factory.

First, using our Cletrac tractor with an Adams leaning-wheel grader, I removed 6" of this dirt (222 cu. yd.); as the grader could not be used within 4 ft. of the sidewalks, this 32 ft. was hand-picked. Then I spread 4" of light gravel and rolled it with our Buffalo gas roller. This was covered with 2" of good packing gravel and rolled down, water being applied continuously to the gravel meantime. This surface was trued up and graded, and covered with Barrett Tarvia at the rate of  $\frac{1}{2}$  gal. to the square yard. Then a light coat of sand was spread with our motor-driven "Hi-way" sand spreader, after which it was rolled with the gas roller. After standing for a day, it was covered with a second coat of Tarvia at the rate of  $\frac{1}{2}$  gal. to the square yard, and this with a heavier coat of sand.

## Are Driveways and Service Entrances Parts of Streets in Paving Contract?

In an action for a balance due for paving done by the plaintiff, a subcontractor on a government job for the furnishing of all labor and materials according to plans and specifications to complete a parking mat and tie down anchors, curbs and "streets" according to specified plans labeled "Paving Additions to Streets and Drives, Plan and Details" the only issue for the jury was whether turnouts, service entrances, and other areas paved by the plaintiff subcontractor were, as claimed by the defendants, included in his contract, or were, as plaintiff claimed, extras and to be paid for. The Fifth Circuit Court of Appeals (Hill & Combs v. First Nat. Bank of San Angelo, Tex.) affirming judgment for the plaintiff in the Federal District Court for Northern Texas (139 F. 2d, 740), held that parol was properly admitted to show whether these specified pieces of work were included in the contract or extras to be paid for.

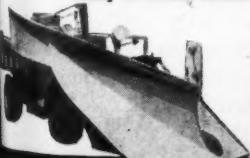
On the plans there was no marking of "Streets" on these areas as shown. It was not disputed that the work done was a part of the defendant's contract with the Government.

The Circuit Court thought that the matter was by no means free from doubt, and leaned to a verdict for the defendants, but it held the matter was one for the jury which, on simple supporting evidence, had resolved it the other way. Normally, the term "Streets" does not include service entrances or driveways leading off from the streets into adjoining premises; but

## FRINK SNO-PLOWS



The Frink "V" Type Sno-Plow uses an entirely different principle than other makes. The rear of the plow is suspended from the truck attachment by two heel adjusting chains so that the weight of the snow on the moldboards is used to create a downward pressure, which ballasts the front end of the truck and counteracts side thrust. This is but one of the many features of the Frink. Write today for further information.



## FRINK SNO-PLOWS

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DAVENPORT-BESLER CORP., DAVENPORT, IOWA  
FRINK SNO-PLOWS OF CAN. Ltd., TORONTO, ONT.

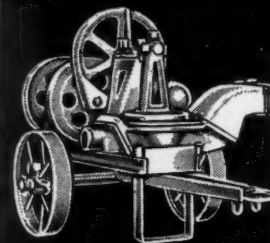
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### Single and Double Diaphragm Pumps

Diaphragm pumps have a definite place in the dewatering pump field. Slow speed and low cost, for pumping sewers and footings where slow seepage and extremely dirty water is encountered. 3" and 4" single and double types. Capacities to 12,000 G. P. H.

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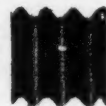
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## CORRUGATED STEEL SHEET PILING

Corrugated Steel Sheet Piling is MOBILE. It is easily pulled, transported, and driven over and over again. And this mobility means economy . . . savings in time . . . investment . . . space and labor. For Corrugated's strong, lightweight construction PLUS its special nesting feature solves transportation problems. Extremely durable, it can be used and re-used—distributing initial cost over many jobs. Our catalogue has complete technical data; tables; and shows various uses.



STANDARD



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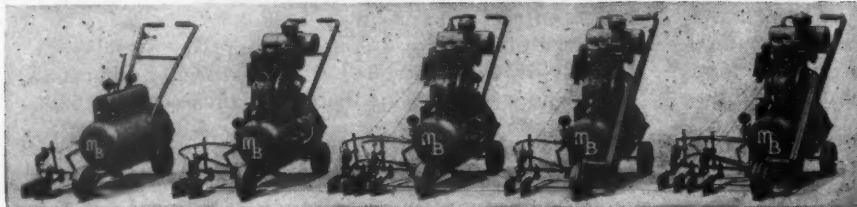
## There's An For Every Street Marking Job!

If you are confronted with the problem of marking streets, efficiently and economically, bear in mind there's an M-B MARKER for every type of striping job — street center lines, parking areas, cross walks, safety zones, bridge abutments, curbs and gutters. And the same machine can mark athletic fields, airports, tennis courts, playgrounds, etc. Quickly convertible to all-purpose paint sprayer. Both hand-propelled and self-propelled models.



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Single line Motorless.

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here, unlike in the ordinary case, the streets and driveways were all parts of the same construction for the same owner.

### Spring Load Restrictions in Minnesota

(Continued from page 29)

any damage is done, but this always meets opposition from a considerable portion of the vehicle operators affected, probably because they do not realize the need for such restrictions until after the roads become impassable, or at least seriously damaged.

"It would appear that if loads were restricted by law during stated seasons, on all roads of the types requiring restriction, such roads would then continue to give very good service to the lighter vehicles throughout the spring period, and the heavier vehicles could resume the use of such roads much earlier in the summer than they could if restrictions are postponed until after some damage is apparent. When roads are seriously damaged, extensive and costly repairs are necessary, and it requires a period of several weeks before such roads can be restored to normal use.

"More extensive use of load restrictions would give better service to all the traffic using the highways, besides saving the state substantial sums in repair costs each year. It would also save untold irritation to the thousands of light vehicle operators who are put to extra expense and inconvenience by the annual breaking up of road surfaces by the small percentage of heavier loads. If load restrictions were fixed by law for stated periods, operators of heavy vehicles would have advance notice and they could plan their hauling accordingly."

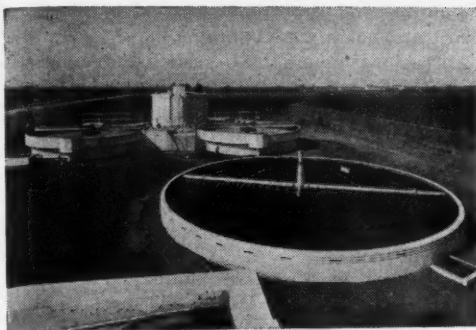
### Fertilizer From Twin Cities' Sludge

(Continued from page 28)

from 33% to 73% and averaged 61% over the entire year. Averages of the results of the analyses grouped according to the percentage of volatile matter, together with the minimum and maximum nitrogen values in each group and the average weather conditions, are given in table No. 1.

In addition to the total nitrogen content, many mineral elements may play an important role in plant growth. Table 2 contains the results of analyses made on a number of samples to determine the major mineral constituents of the sludge cake ash.





Disposal plant at Stockton, Calif., state hospital.

### Handling Sewage Sludge

Trouble caused by trash or ground screenings coming through the settling tanks can be reduced by  $\frac{3}{4}$ " to 1" spacing of screen bars, and discharge of ground screenings on the upstream side of the screen. When there are many leaves, remove them unscreened.

For pumping sludge, both displacement and screw-feed centrifugal pumps have advantages; the latter is simple, clean and easy to maintain; the former is better for high suction lift or discharge pressure. It is well to have a pump designed for over 50 lb. pressure to provide for occasional clogging in the discharge line. The triplex plunger pump with variable-speed gear drive has advantages over the duplex variable stroke.

Reasonably high velocity in the sludge line will not cause excessive pressure unless it becomes partly plugged, as by grease, and then it should be cleaned. Scum should not be pumped alone but should be mixed with sludge, and be followed by pumping sludge alone. Grease can be removed by introducing steam, raising the temperature to 180°.

For metering sludge, a Venturi meter without a piezometer ring is probably the most satisfactory. Meter connections should be flushed daily or oftener.

In a sludge tank, provision for keeping the top sludge (scum) moist and circulation are helpful. Addition of chemicals for pH control may help digestion of scum.<sup>G4\*</sup>

### Eliminating Digester Supernatant

At Scott Field, Ill., which operates two digesters, piped to be used in series, supernatant was returned to the raw sewage wet well and, being high in solids, interfered with satisfactory treatment. After trying several suggested remedies, with little success, the following procedure was adopted and for three months has proved successful: Temperature of digester No. 1 was kept at 102° F; 10,000 gal. of sludge was pumped from sedimentation tank to digester every day (the digester capacity being 400,000 gal.), and 12,000 gals. each of six days a week sludge was drawn off to the drying beds. So there was no supernatant. The digested sludge averaged 6% solids, 46% volatile.<sup>G3\*</sup>

### Chicago Runoff Formula

The City of Chicago Department of Sewers informs us that, in the "Sewerage Digest" for February, page 57, the second formula should have been  $I = \frac{90}{11 + t^{0.9}}$

### Ferric Sulphate In Sewage Treatment

The Joint Meeting treatment plant at Rutherford, N. J. treating about 2.2mgd found it difficult in 1943 to obtain delivery of liquid ferric chloride or alum, so tried ferric sulphate as a coagulant. After adjusting the feeding equipment, a run of a few months showed that the sulphate, at

\*See Bibliography in the March issue.

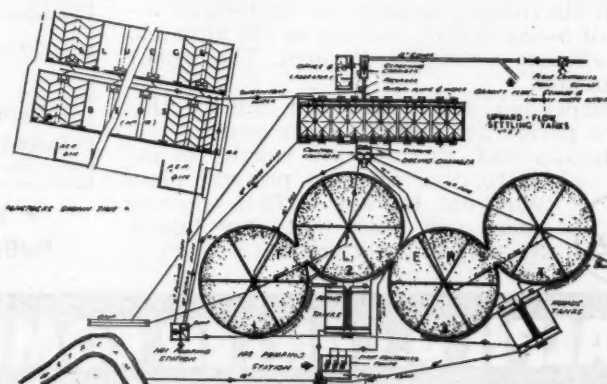
# The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

\$31.60 per ton, was more economical than liquid ferric chloride and alum, and indicated that "there is a definite field for ferric sulphates in small and medium size plants where ferric chloride, making due allowance to its higher iron content (33%), is more expensive than ferric sulphate, and in cases where alum may be unsuitable due to the characteristics of the sewage."<sup>H16</sup>

### Alternating Double Filtration

At a military camp in the south of England a filtration plant went into operation in October, 1942, treating about 250,000 gpd in four upward-flow sedimentation tanks, four filters and two pairs of humus tanks. Each filter was 95 ft. in diameter with 5 ft. working depth of clinker, the top layer graded  $1\frac{1}{2}$  in. to  $\frac{3}{4}$  in. size, dosed by 4-arm revolving distributors. Bottom aeration was provided by standpipes and by fourteen 3 in. effluent pipes in the wall of each filter. The humus tanks were horizontal flow, 35x18 ft. by 5 ft. average depth. This plant treated a strong and greasy camp sewage. In September, 1943, a laundry plant was installed at the camp, discharging 10,000 gph, which would exceed the capacity of plant as then operated. It was believed that double filtration would give the necessary capacity and be cheaper than adding more filters, and this was adopted. Settled sewage is applied to two of the four filters for a period of one day and their effluent settled and pumped to the other two; then, at the end of this period, the two latter filters received settled sewage and their effluent was pumped to the other pair. The necessary pumps, piping etc., were installed and double filtration began Sept. 13, 1943, the laundry discharging 185,000 gal. per 16-hour day of waste water, containing a large amount of suspended matter. Filters 1 and 2 operated as a pair and filters 3 and 4 as another, alternating at 8 A. M. daily. After increasing the size of the drainage outlets to prevent waterlogging of the filters and making other changes, in the spring of 1944 the plant treated tank effluent at an average rate of 80 gpd per cu. yd. of filtering medium. The B. O. D. was reduced from 335 ppm. to 4.5, absorbed oxygen from 57 ppm. to 9. Under single filtration, the rate had averaged 45 gpd per cu. yd. and the effluent had been unsatisfactory. The cost of changing to double filtration was about \$20,000 less than would have been extension of single filtration.<sup>D10</sup>



Courtesy The Surveyor  
Diagram of alternating double filtration plant.

### Fertilizing Value Of Sewage Sludges

In experiments conducted by the Agricultural Research Council of Great Britain, comparisons were made between the fertilizing values of sludges from industrial sewage, from domestic sewage, and from barnyard manure, alone, combined, and with the addition of chemical fertilizers; on different soils and with different crops. Their tests suggest that there is little loss of nitrogen in digestion or activation (although American practice appears to lead to a much greater loss in digestion), but an appreciable loss in shed drying.

"It is clear from the results we have already obtained that classification according to the nominal process of treatment at the works is sometimes inadequate. We have had some so-called raw sludges which behave in the laboratory and pot culture house in the same way as most of the digested sludges. Sometimes it is obvious that the drastic

methane-fermentation and digestion have taken place in drying beds or subsequently on storage in pits. On the other hand, an occasional nominally digested sludge closely resembles the bulk of the raw sludges.

"It is clearly important to know what kind of sludge has most agricultural promise and what types may be better disposed of in other ways. Laboratory nitrification and fermentation tests and suitable pot culture experiments give information about the availability of the nitrogen or phosphoric acid in sludges. Pot trials can also be used to test for toxic substances."

Farmers complain of weed seeds in sludges. These may come from weeds growing near the drying beds, and it might be well to prevent such growths.<sup>113</sup>

### Operating Mechanical Activated Sludge Plants

This article summarizes data furnished by 29 plants in which were installed the three most common types of mechanical aerators. Satisfactory operation of such a plant requires control of: 1—Mixed liquor solids concentration. 2—Rate of returning sludge. 3—Application of air. 4—Aeration period. 5—Condition of the activated sludge.

Fourteen of the plants carry average solids of 600 to 1,000 ppm, 5 carry solids of 300 to 500 ppm, 6 of over 1,000 ppm and 1 of only 200 ppm. In general, the amount of mixed liquor solids that can be carried in a plant is limited only by the air supply and by certain hydraulic capacity factors. Most of these plants use the suspended solids test as the basis for controlling the mixed liquor solids, but five plants use settleable solids. Many plants use centrifuge results as a control test. It is suggested that mixed liquor solids be varied to meet seasonal variations in load and temperature. Only one of the operators uses the volatile content of the mixed liquor solids as a control basis.

Of 24 plants, 12 employ rates of return sludge between 20% and 30%, 8 between 30% and 50%, 1 a rate of 61% and 3 under 20%. There appears to be no definite relation between this rate and the concentration of return sludge.

The aerators are operated from 40% of the time, in one plant, to 100%, in 7 plants. This is generally determined by the dissolved oxygen content of the mixed liquor, this varying from 0.3 to 6.6 ppm at the outlet. One aerator manufacturer recommends 3.0 ppm, another that a positive trace of dissolved oxygen in all parts of the aeration tank at all times is sufficient.

The condition of the activated sludge is indicated by: 1—Physical appearance and odor. 2—Settling characteristics and sludge index. 3—Microscopic examination. 4—Sludge activity (oxygen demand) as determined by the Odeometer or by direct chemical methods. A well conditioned sludge is usually a golden to moderate brown, has a pronounced spicy odor and, when placed in a glass cylinder, quickly forms clearly defined flocs and settles readily. Thirty-minute settleable solids in the 10% to 20% range are most common. Use of microscopic examination was reported by 5 plants, sludge activity by one.



Illustration showing typical  
CARTER siphon operating  
at Pearl River, N. Y.

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Suspended solid reduction during this same period averaged 91.7 per cent.

Results such as these are worthy of investigation for that postwar plant. Why not let a CARTER engineer assist you with that new layout. No obligation of course.



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Among the operation problems discussed was bulking, caused by shock loads from industrial wastes, septic sewage, loss of operation balance, overloading, and by high pH in one plant. Other problems were rising sludge in final clarifiers, grease and oil in the sewage, disposal of the waste activated sludge and of supernatant liquor.<sup>C30\*</sup>

### Rising Sludge In Hopper Tanks

At East Middlesex (England) Main Drainage Works, four pyramidal humus tanks with 26 ft. water depth accumulated scum blankets 4 to 6 in. deep, caused by rising sludge. To prevent this, sludge was drawn continuously from the bottom of the hopper by providing, on each sludge-withdrawal pipe, a riser pipe overflowing 4" below the level of the tank outlet weir, the overflow going to a settling tank. The head and size of pipe caused a continuous flow of sludge equal to about 5% of the flow through the tank; a lower rate did not maintain continuous entrance of sludge into the bottom of the sludge pipe. At this rate the suspended solids were about 1740 ppm. This procedure has prevented accumulation of floating sludge on the deep tanks.<sup>D9</sup>

### Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

- D** *The Surveyor*  
February 2
8. Infiltration of Subsoil Water Into Sewers. By W. H. Elgar. Pp. 59-60.
  9. p. Some Experiences With Rising Sludge in Humus Tanks. By L. F. Mountfort. Pp. 65-66.
- February 9
10. p. Treatment of Camp Sewage and Laundry Waste Water by Alternating Double Filtration. By E. V. Mills and J. T. Calvert. Pp. 79-80.
- February 16
11. p. Disposal of Liquor Resulting From Heat Treatment of Sludge. Discussion of D8. Pp. 92-95.

- February 23
12. Self-Cleansing Gradients for Sewers Flowing Partly Full. By L. B. Escritt. Pp. 107-108.
  13. p. Manurial Value of Sewage Sludges. By E. M. Crowther. Pp. 111-113.

### G *Water Works and Sewerage* February

5. Developments of the Year in Sewerage and Industrial Wastes. By Albert E. Berry. Pp. 37-44.

### H *Sewage Works Engineering* February

9. Trends in Design and Construction of Sewers and Appurtenances. By Chester A. Smith. Pp. 65-67, 108.
10. Designing Better Sewage Pumping Stations. By Clinton L. Bogert. Pp. 67-68, 108.
11. Grit Washing, Screenings Grinding. By Darwin W. Townsend. Pp. 69-70, 108.
12. Fundamentals in Plant Design. By Frank C. Tolles. Pp. 71-72.
13. Functional Design Trends in Sewage Settling. By Thomas R. Camp. Pp. 73-74, 108.
14. Trends in Sewage Works Equipment. Pp. 75-79.
15. Purdue Stages Conference on Industrial Waste Utilization. By Don E. Bloodgood. P. 82.

### March

16. Three Months' Operation With Ferric Sulphates. By Albert B. Kozma. Pp. 134-136.
17. Sludge and Waste Treatment. By Samuel A. Greeley. Pp. 137, 142.

18. Dewatering and Incineration. By S. I. Zack. Pp. 138-139.
19. Equipment Maintenance in Time of War. Pp. 145-146.
20. The Performance of Sludge Gas Engines. Pp. 148-149.

### J *American City* February

5. Economical Operation at Gary's Treatment Plant. Pp. 76-77.

### March

6. Smoothing Out the Kinks at an Army Treatment Plant. By R. de Val Garff. Pp. 85-86, 115.

### L *Civil Engineering* February

1. A Rational Approach to Stream Pollution Studies. By F. W. Kittrell. Pp. 69-71.

### M *Water and Sewerage* February

8. Causes and Prevention of Gas Hazards in Sewers. Pp. 31-32, 54.

### P *Public Works* March

10. Making a Solids Balance at a Sewage Plant. Pp. 21-22, 32.
11. Observations on Bio-Filter Loadings. P. 26.
12. Test of Sludge Flow in a 16-Inch Cast Iron Pipe. Pp. 27, 36.
13. n. Damages for Destruction of Town's Sewer. P. 40.
14. n. Potato Dehydration Wastes in Sewage. P. 48.

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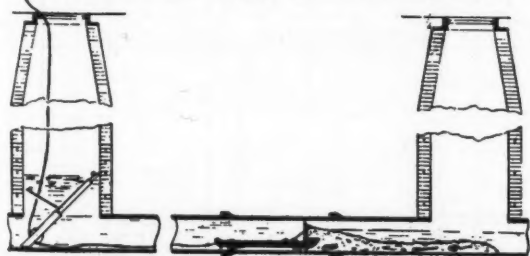
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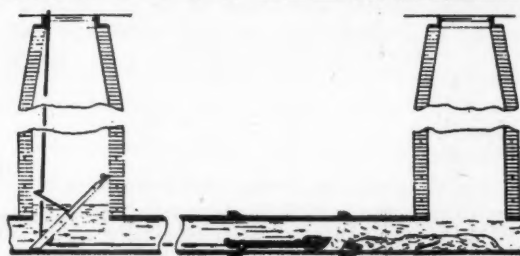
The head pressure of the water in the line furnishes the motive power and if the flow of sewage is small more water may be added. Often a six inch head is sufficient. The rubber edged, hinged Shield is opened to allow the velocity of the water to flush the debris ahead. This CONTROLLED FLUSHING plus the forward movement of the Sewer Scooter removes all the sand, rocks, bricks, broken rods and things that find their way into sewers and makes so called "sanitary sewers" a fact for the first time. The Sewer Scooter leaves nothing behind.

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# The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

## Water Supplies Of the Southwest

Rocks of all geologic ages crop out in the Southwest (Arkansas, Oklahoma, Louisiana and Texas), offering a great variety of groundwater conditions. The author groups the more important aquifers geologically—Lower Palozoic, Pennsylvanian, etc.<sup>A36</sup>

These Southwest states contain 430,000 sq. mi., on which live 13,000,000 people. The surface water facilities vary widely; the rainfall rates varying from 60" a year in Louisiana to 8" in a portion of Texas near El Paso. Averaging the entire area, about one-sixth of the rainfall reaches the streams as runoff, ranging from less than 1" a year in western Texas to 20" in southeast Louisiana. Of the 335,500 sq. mi. drainage area of the Rio Grande, about 48.8% yields no runoff. The combined average annual runoff of all the streams within the four states and bordering thereon is about 500,000,000 acre-feet. The limited water resources of Texas and Oklahoma will determine the ultimate development in these states. It is essential, therefore, that the waters of the entire region be properly conserved and controlled, and that the quality and temperature of water be preserved for beneficial use of the entire region.<sup>A37\*</sup>

## Cement Lining Large Pipes

A 48" steel and 36" cast-iron main serving Trenton, N. J., were cleaned and lined with cement in 1941. In the 5-year period preceding this, leaks developed an average of eight times a year, but since the lining no leak has developed and no leakage that is practicable to measure. In cutting out sections of pipe to admit the machines, three methods were available—tool bits traveling around the pipe, a rotary saw traveling around the pipe, and an oxy-acetylene cutting torch.<sup>A39</sup>

Washington, D. C., lines all new steel mains with tar-base enamel and cast-iron pipe with cement; and is planning to restore all old tuberculated mains to their original capacity. They have cleaned and lined with cement a mile of 36" c. i. pipe, raising its Hazen-Williams coefficient from 70 to more than 140; the coefficient of a 24" main was increased from 50 to 121, and that of a 20" from 62 to 123. The cleaning and lining of the 36" main cost \$3.92 per lin. ft., including all materials, labor and pavement repair. Cleaning only cost 11 cts. per ft. for the 24" and 20" pipe.<sup>A40\*</sup>

## Water Supplies Of Puerto Rico

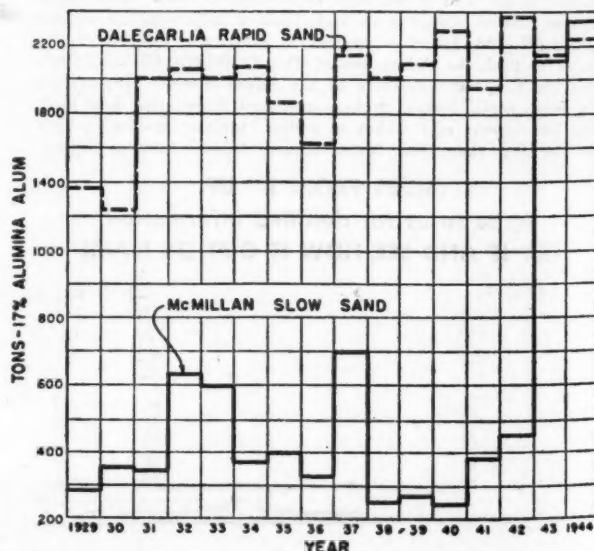
Of the two million population of Puerto Rico, 70% consume untreated water, 20% inadequately treated water, and only 10% water that is bacteriologically safe. The island's highest mortality rate is caused by enteric parasitic and bacterial diseases which are largely water borne; and provision of ample supplies of safe water for

domestic use has been said to be the island's No. 1 public health problem. Modern rapid sand filtration plants serve 463,000 people in thirteen municipalities; the remaining 64 municipalities treat their supplies by chlorination or not at all. In 1943 the San Juan plant was the only one that produced effluent which consistently met the bacteriological requirements of the U.S.P.H.S. for drinking water. It is estimated that it would cost 7.7 million dollars to bring the urban water supplies up to adequate standards.<sup>L2</sup>

## Uprating a Slow Sand Filter

The McMillan slow sand filter, Washington, D. C., built 40 years ago, has had its capacity increased from 75 mgd to 125 mgd, and it may be possible to carry a peak load of 150 mgd for short periods. Part of this has been effected by the use of more coagulant in the pretreatment than would be necessary for a rapid sand plant and five times the previous average. The capacity of the 29 filter beds has been increased by improving the methods of cleaning the sand, hydraulics of the structure, and rate of flow to the filters.

The sand had been cleaned by shoveling a 2" layer of sand into hydraulic ejectors, washing it, and returning it after six filter cleanings. Now five self-propelled machines, electric motor driven, are used. These pick up the sand, clean it in a separator mounted on the top, and deposit it on the bed immediately behind the machine; the wash water and suspended dirt being removed through hose. The original depth of 36" of sand is reduced to 24", since that removed for cleaning is at once returned.



Courtesy Am. Water Works Ass'n  
Graph showing increased alum consumption at McMillan filters during the past two years.

\*See Bibliography in the March issue.





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Each machine cleans about 7 cu. yd. of sand an hour. Also a small tractor and machine-drawn filter rakes are used to break up the surface. By using these it is possible to maintain 23 to 25 of the 29 filters in service at all times. The filters are being given a preliminary thorough washing to a depth of 16", after which they give satisfactory service with 4 to 6 rakings between washings.<sup>A49</sup>

### Russia's Water Supplies

Water consumption in the Soviet Union averages 24 to 31 gpd in houses having baths and sewered; 16 to 20 if there are no baths; 9 to 13 where water is brought from street pumps. In large cities it reaches 66 gpd. The water resources of the country are being surveyed; those of over 1.5 million square miles have already been surveyed.

Sanitary zones for protection of sources of supply have been established. All surface supplies are purified in set-

ting tanks, coagulated, filtered and disinfected, under laboratory control.

With the migration of industry east when Germany invaded western Russia, new water systems had to be installed in minus 40° temperature with essential materials lacking. Wood was used for water towers and cisterns, reservoirs were made of earth lined with clay or asphalt. Pipe joints often were welded.

As the Germans were driven back, they wrecked water towers, reservoirs, pumping stations, purification plants and dams, and the prompt restoration of these was a prime necessity. Engineers immediately survey the damage and plan temporary repairs. Wells are sunk, water is pumped from rivers by floating pumps, and portable purifiers are used. Centrifugal pumps driven by automobile motors are used, and pulsometers, ejectors and turbine pumps driven by steam from locomotives. Of the many ingenious devices employed, an elevated water tower was repaired from cradles suspended from barrage balloons,

to avoid the delay of erecting scaffolds. Postwar water supply development has been planned on a gigantic scale.<sup>F15</sup>

### Chlorine, Chloramines and Changes in pH

Testing effects on Esch. coli and Eber. typhosa, with a contact period of one hour, "At normal pH values, approximately forty times more residual chlorine as chloramine was required to produce a 100 per cent kill of Esch. coli in the same time interval. For Eber. typhosa, this ratio was about 25 to 1.

"On the basis of the time required to produce a 100 per cent kill with equivalent amounts of residual chlorine, as free chlorine, and as chloramine, results were not readily obtainable for the lower pH zones. In this range, the lethal amounts of free chlorine are much less than the amount of chloramine required to produce a 100 per cent kill in any reasonable period (four to six hours). At pH 9.5, where such comparisons were possible, chloramine required approximately 100-fold the period for free chlorine."<sup>F14</sup>

### Meter Control Increases Revenues

Brookline, Mass., has nearly 8,500 meters in use. It has made a systematic and regular inspection of its meter performance since 1936. If any meter shows a falling off in registration for the quarter, it is investigated, generally being tested in place, using a standard testing can; if under-registering, it is removed and overhauled. When a  $\frac{5}{8}$  in. meter registers more than 40,000 cu. ft. in a year it is replaced with a  $\frac{3}{4}$  in.; if a  $\frac{3}{4}$  in. exceeds 140,000 cu. ft. it is replaced with 1 in., etc. When any meter has registered five times the annual limit for its size, or has been in service for more than ten years, it is overhauled. After this system had been in operation for seven years the revenue had increased 42% although the population had increased by only 500. Meters are stored in a semi-humid basement of the meter building and there has been little drying up of gaskets and packings.<sup>B10</sup>

### Chlorine Terms And Practices

"Break-point chlorination" is now recognized to be the production and

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maintenance of free chlorine residuals. "Superchlorination" is the addition of chlorine beyond that needed to obtain an initial residual and without regard to the type of residual produced; "dechlorination" is the lowering of this residual to a workable figure. "Marginal chlorination" refers to the addition of sufficient chlorine to obtain an initial residual without regard to the type of residual. "Chloramination" refers to the use of chlorine and ammonia to form chloramines. "Prechlorination" and "post-chlorination" refer to the addition of chlorine before or after filtration. "Secondary chlorination" (sometimes called "relay chlorination") is the addition of chlorine at one or more points in the distribution system subsequent to that at the purification plant. "Reservoir chlorination" is the use of chlorine at distribution reservoirs for controlling bacteria and algae.

The literature of the past few years indicates that:

- 1) Proper control of chlorination will remove free ammonia from water and will leave a residual of free available chlorine.
- 2) Free available chlorine will eliminate practically all types of bacteria from water.
- 3) Temperature and pH of the water, together with exposure to and magnitude of the residuals have considerable bearing on the elimination of bacteria.
- 4) Destruction of coliform organisms at high pH values (about 11.0) requires considerable time.
- 5) Many new tests have been perfected to distinguish between chlorine and chloramine residuals.
- 6) An exceptionally good test has been developed to evaluate the extent of false residuals.
- 7) The reactions between chlorine and ammonia have been clarified.
- 8) The reactions between chlorine and ortho-tolidine have been explained.
- 9) The sterilizing velocity of other agents such as bromine and chlorine dioxide has been studied.
- 10) The proper conditions for the consistent evaluation of chlorine with ortho-tolidine have been established.
- 11) New chlorination terms have made their appearance; other terms have been clarified.
- 12) New uses for chlorine have been found, and old uses have been amplified.<sup>B11</sup>

#### Cost of Wells In New England

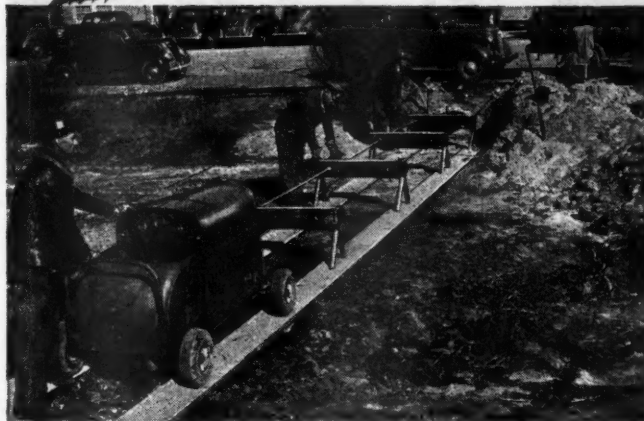
In New England, the cost, under average conditions, of all items incident to the installation of wells but not any pumping equipment, generally come within the following limits: Shallow tubular wells, from somewhat less than \$20,000 to \$30,000 per mgd yield. Gravel-packed wells, \$10,000 to \$15,000. Radial process wells, \$10,000 to \$20,000 if the capacity of a well exceeds 25 mgd; but five times as much if the capacity is less than 1 mgd. Where conditions are favorable, an infiltration gallery may cost as little as \$7,000 per mgd.<sup>B13</sup>

#### Clarification By Flotation

Experiments in the removal of suspended and colloidal matter by the flotation method, using 34 different North Carolina raw water surface supplies, indicate the possibility that this method may be practical for preparing water for filtration, requires less time than present methods, and less special equipment. In the experiments, 20 ppm of a wetting agent ("Roccal") was used, and 10 min. aeration. Turbidities ranging from less than 1 to 620 ppm were reduced an average of 70%, suspended solids ranging from zero to 380 ppm were reduced 79%; and there was an average reduction of 90% in bacterial plate count. One sample that had color but no turbidity was rendered colorless.<sup>A53</sup>



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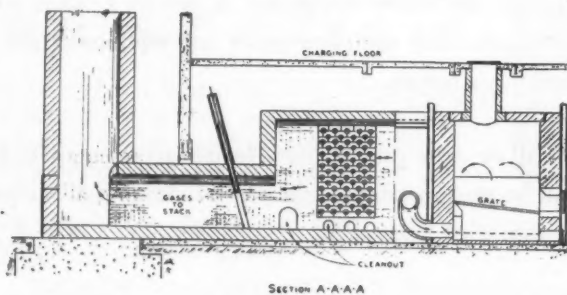
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## Bibliography of Waterworks Literature

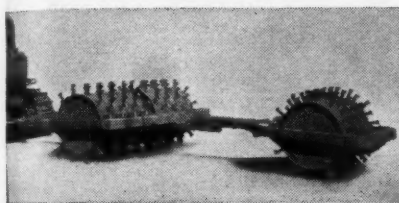
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c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

- A** *Journal, American Water Works Ass'n*  
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46. Corrosion of Steel and Its Mitigation. By W. R. Schneider. Pp. 245-259.
  47. Liability for Water-Borne Diseases. By James H. Howard. Pp. 260-266.
  48. Classification and Control of Maintenance. By F. R. Berry. Pp. 267-268.
  49. Upgrading the McMillan Slow Sand Plant. By J. C. Smith. Pp. 269-279.
  50. The Conservation of Water Resources and Its Progress in Maryland. By Joseph T. Singewald, Jr. Pp. 280-288.
  51. Practicing Ground Water Conservation. By G. J. Requardt. Pp. 289-293.
  52. Use of Copper Sulfate in the Control of Bacteriological Aftergrowths. Progress Report. By Frank C. Amsbury, Jr. Pp. 294-301.
  53. Water Purification by Flotation. By Samuel H. Hopper. P. 302.
  54. Water Works Practice. Committee Report. Pp. 303-313.
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8. Notes on Water Supply in North African Campaign. By William E. Stanley. Pp. 293-306.
  9. Groundwater Studies in Northeastern Massachusetts. By M. L. Brashears, Jr. Pp. 307-316.
  10. Practice of Determining Sizes of Service Pipes and Meters. By Walter B. Bushway. Pp. 317-321.
  11. Chlorination—A Five-Year Review. By A. E. Griffin. Pp. 322-332.
  12. Financing New Water Systems in Massachusetts—Present Practice and Trends. By Paul F. Howard. Pp. 333-337.
  13. Ground Water Supplies—Present Practice and Trends. By Donald E. Stearns. Pp. 338-343.
  14. Water Filtration—Present Practice and Trends. By E. Sherman Chase. Pp. 344-347.
  15. Pumping Station Equipment—Present Practice and Trends. By Ralph P. Hall. Pp. 348-352.
  16. Pipes for Distributing Systems—Present Practice and Trends. By Herman G. Dresser. Pp. 353-355.
  17. Design and Construction of Standpipes and Elevated Tanks for Distribution Systems. By Howard E. Bailey. Pp. 356-366.
- D** *The Surveyor*  
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5. The Water Bill of 1945. P. 87.
- E** *Engineering News-Record*  
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5. Water Storage for the Nation's Capital. Pp. 67-69.
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6. n. Algae in Cleveland Water Requires Much Carbon. P. 125.
- F** *Water Works Engineering*  
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16. Unused Lengths of Oil Pipe Made Into Larger Water Line. By Elbert E. Lochridge. Pp. 184-187.
  17. Washing Rapid Filter Sand Beds. Pp. 188, 211.
  18. p. Tastes and Odors Removed by Chlorine Dioxide Treatment. By John F. Synan, J. D. MacMahon and G. P. Vincent. Pp. 192, 211.
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  20. Algae Growth Reduced After Stocking Pond With Fish. By James M. Caird. P. 240.
  21. Extremes of Rainfall. Pp. 243-244.
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- G** *Water Works and Sewerage*  
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  9. Cathodic Protection of Steel Surfaces in Contact with Water. By Lee P. Sudrabin. Pp. 51-57.
  10. Water Meters. By J. Fred Keller. Pp. 58-60.
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- J** *American City*  
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6. Kansas City Remodels Settling Basins. By Elmer Chapman. Pp. 77-79.
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- M** *Water and Sewage*  
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  4. Waterworks Improvements for Petrolia, Ontario. By G. Graham Reid. Pp. 24-26, 53.
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- P** *Public Works*  
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12. A Half-Century of Keeping a Water Plant Up to Date. By E. A. Roberts. Pp. 18-20, 50.
  13. c. Carrying a Water Main Across a Ravine. By R. H. Snyder. P. 23.
  14. Mine Water for the Water Supply of Virginia, Minn. By M. C. Bright. Pp. 29-30, 34.
  15. n. Illinois Public Water Supplies. P. 52.
  16. n. Liability for Leak in Municipal Service Line. P. 54.
- W** *Johnson National Drillers Journal*  
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1. Testing Pumping Units for Efficiency. Pp. 1-4, 7, 10, 11.



# Keeping Up With New Equipment



Baker sheepfoot tamping roller in tandem.

## New Sheepfoot Tamping Rollers—Baker Manufacturing Company

A new line of Sheepfoot Tamping Rollers are being built by The Baker Manufacturing Company, builders of bulldozers, gradebuilders, discs, rippers and other construction equipment and snow plows for use with Allis-Chalmers crawler tractors. The Sheepfoot Tamping Roller will be put into limited production as war conditions permit.

Features include: heavily reinforced box-type welded steel frame; rollers that turn on axles which pass through lubricant-retaining tubes so that weighing fluids cannot come in contact with axles; self-aligning roller bearings on

each side of roller; forged tampers with readily renewable heads to minimize tearing up of compacted material; shear type tamper cleaners, front and rear; and spring-cushioned drawbar.

Each roller in its frame constitutes a unit. Tongue is removable. Dual and Triple Roll units are formed by using front and rear tie bars which permit rolls to oscillate independently of each other. A clevis on rear tie-bar permits use of rolls in tandem.

Baker Tampers are available in single, double and triple roll units as standard units. A bulletin describing them, No. 847, is available from the Baker Manufacturing Company, 501 Stanford Ave., Springfield, Illinois.

## Builders Iron Foundry Celebrates 125th Birthday

Builders Iron Foundry, and its affiliates, Builders-Providence, Inc., %Proportioners, Inc. % and Omega Machine Co., Providence, Rhode Island, recently held a triple celebration to commemorate the Company's 125th Anniversary, to honor 270 employees having from five to fifty-four years of service, and to celebrate the award of the Fifth



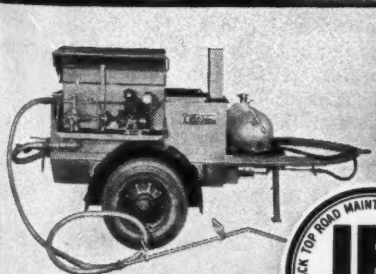
H. S. Chafee, President (right) congratulates Harry S. Dolbey, Builders Research and Service Man (left), upon his fifty-four years of continuous service.

Army-Navy E just received by the concern.

At a dinner the company presented the 270 employees with pins signifying five, ten and twenty-five years of service. Harry S. Dolbey, Research and Service Man; Albert B. Coulters, New England Representative; Peter Morrison, Pattern Maker; James B. Cook, Core Maker; Charles G. Richardson, Vice President and Manager of Municipal Sales; and Thomas G. Healey, Foundry Foreman, received special congratulations, each having served over 40 years.

## LITTLEFORD 84-HD MAINTENANCE KETTLE

This Tar and Asphalt Kettle speeds up repair work because it heats faster. For Streets, Roads, and Highway Maintenance, the 84-HD Kettle does the job the modern way. With Hand or Motor Spray Attachment, the 84-HD is a more versatile unit. Ask for Bulletin No. 1 for further details.



**LITTLEFORD**

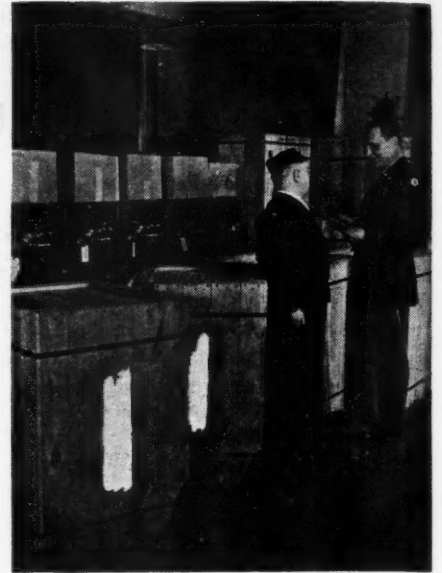
LITTLEFORD BROS., Inc., 452 E. PEARL ST., CINCINNATI 2, OHIO

Reciprocating in kind, the Employees of Builders presented the Company with a Service Award in the form of a giant pin studded with five diamonds to commemorate one hundred twenty-five years of continuous service by the Company. Henry S. Chafee, President and Treasurer, accepted the Award for the firm and presented the service pins to the employees. D. J. Purdie, of the New York Office, with thirty-three years service, was Toastmaster.

### Water Supply Equipment Ordered for Manila Before Fighting Stops

While General MacArthur's troops

were still fighting in the streets of Manila, the vital importance of the city's water supply was recognized and chlorination equipment was ordered to be shipped by plane. A top priority order was placed by the New York District of the U. S. Army Engineers with Wallace & Tiernan Co., Inc., Belleville, N. J., for two automatic chlorinators and under the able direction of Colonel E. W. Garbisch, District Engineer, Major O. H. Kolloch, Contracting Officer, and their staffs the shipment was made in record time. The special chlorinators were rushed to completion under the guidance of Engineer Corps expeditors and turned over to the Army at Belleville. The District Engineer



Col. Garbisch checking shipment of chlorinators in Wallace and Tiernan shipping room.

office will deliver the shipment to the Army Transport Command for delivery by air to Manila.

The United States Army carries with it a great variety of water purification equipment designed to meet every possible emergency. Wallace & Tiernan manufacture a great part of this equipment and most of it is procured under the direction of the New York District Engineer Office. This equipment, however, is designed for portability and used by troops in the field; therefore, it is not suitable for a large municipal water supply such as that in Manila.

Before Japanese occupation the water supply at Manila, serving a population of over 623,000 included a modern filtration plant which was adequately protected by several Wallace & Tiernan Chlorinators. In addition Wallace & Tiernan chlorinating equipment protected the water supplies at the Cavite Naval Base, Camp John Hay and Fort Stotzenberg as well as many other points in the Philippines.

### New Sizes Added to Line of MacWhyte "Level-Lift" Slings

The complete line of MacWhyte Caldwell "Level-Lift" Slings, all patented, are now made in  $\frac{3}{4}$  ton,  $1\frac{1}{2}$  ton, 3 ton, and 6 ton capacities.

The operation is simple. After the light-weight block containing wire rope is put on the crane hook, the crane operator spots the crane hook over the approximate center of gravity of the load and the floormen attach the sling to the load.

The crane operator then applies the power to lift the load and as the crane hook is lifted, the rope automatically adjusts itself through the "Level-Lift" block. In so doing, one sling leg of rope becomes longer than the other, and as the weight of the load pulls on the wire rope, the sheave in the block pulls down against a brake which prevents

## DEPENDABLE GAS STORAGE

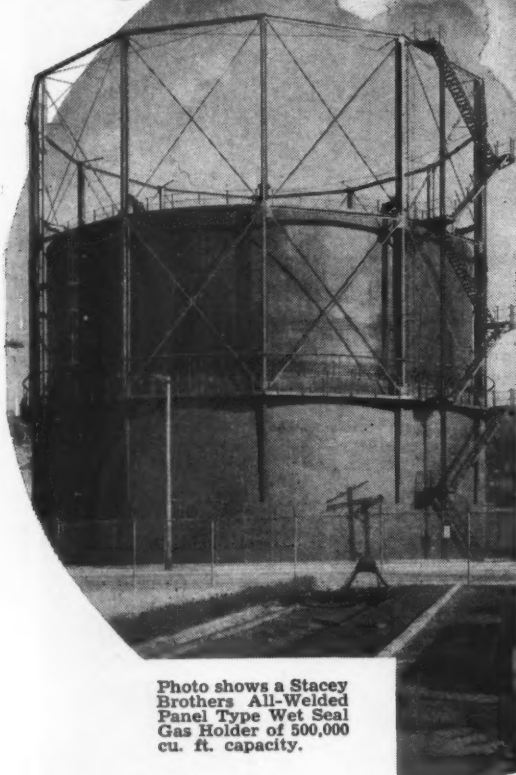


Photo shows a Stacey Brothers All-Welded Panel Type Wet Seal Gas Holder of 500,000 cu. ft. capacity.

## FOR Peak demands

If your municipality operates its own manufactured or natural gas plant or sewage treatment plant—you will be interested in Stacey Brothers Gas Holders for storing the gas to meet emergency of peak demands.

The Stacey Brothers Gas Construction Company is one of the oldest, as well as the recognized leader in designing and supplying gas holders throughout the Western Hemisphere. The performance records of our holders stamp them as outstanding for dependability, economy, and long service. We produce both wet and dry seal types for low pressures, and various high pressure types. Write for complete information.

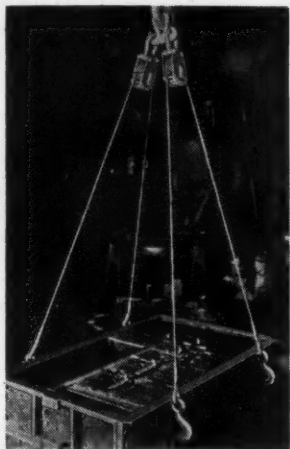
### The STACEY BROS. GAS CONSTRUCTION CO.

One of the Dresser Industries  
5535 VINE ST., CINCINNATI 16, OHIO



When writing, we will appreciate your mentioning PUBLIC WORKS





The "Level-Lift" sling has found many uses where loads must be lifted level. Here a pair of slings handle a foundry flask.

slippage. The load is then lifted level.

Should the crane operator not get the block and crane hook close enough to the center of gravity of the load, it is only necessary for the operator to lower the load enough to relieve tension on the sling which releases the brake and then move the crane hook over a little to the true center of gravity. On applying the power, the ropes readjust themselves and the load rises level.

For complete information, MacWhyte Company will be glad to send you a copy of Folder No. 44-71 which shows complete specifications and pictures of the sling in use.

### Graham-Paige Will Produce "Rototiller"

Graham-Paige Motors Corp. has acquired manufacturing rights and exclusive North and South American license rights to manufacture and sell machines of this type, including road-making and heavy-duty farm models, from Rototiller, Inc., of Troy, N. Y., which will continue to build a small wheelbarrow-type model and various attachments.

Graham-Paige plans to utilize the distributor and dealer organization built by the Troy concern and to expand these outlets to handle the company's line of farm machinery.

### Ransome Machinery Co., a Worthington Subsidiary Adds to Its List of Equipment

Worthington Pump and Machinery Corporation becomes one of the nation's largest manufacturers of construction equipment with the acquisition of the Ransome Machinery line of concrete machinery.

A handsomely illustrated 48-page presentation entitled "A Preview," displays not only the products in the present combined lines, but several new types of equipment under development to be ready for production after the war. All products will carry the well-known "Blue Brute" trade name

and with Worthington's line of contractors' Portable Compressors, Rock Drills and Air Tools will blanket the construction field.

C. F. Oechsle, Worthington's Assistant Vice-President, has been placed in charge of the Worthington-Ransome Construction Equipment Sales Organization, with headquarters at Holyoke, Massachusetts. He will be assisted by W. F. Lockhardt, Sales Manager of Ransome Machinery Company located at Dunellen, New Jersey, and W. J. Fleming, Field Sales Manager, located at Holyoke, Massachusetts.

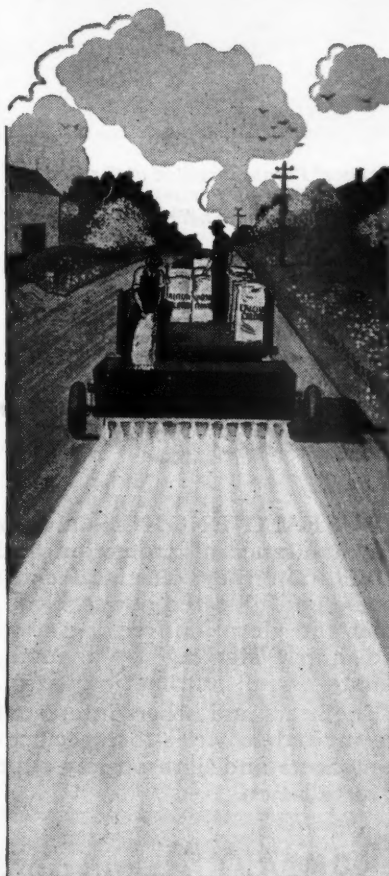
Five regional offices located in New York, Washington, D. C., Cleveland, Chicago, and San Francisco will afford nation-wide service.

### Expelsor Sewage Ejector

Yeomans Brothers Co., 1433 N. Dayton St., Chicago 22, has published a new 12 page well illustrated folder describing Expelsor Sewage Ejector designed for medium to small sewage systems.

Solids up to the size of inlet and discharge connections will pass through without trouble. Since the discharge opening is only a few inches from the bottom of the receiver, the pot is flushed in every cycle.

For operation by direct current motor, the Expelsor is equipped with a spherical float which is raised as the receiver fills. Lifted to a predetermined level, the float causes contacts to be energized which start the compressor motor and



Substantial road improvement is the reward of the highway official who conditions his gravel roads early, while moisture is still available for proper shaping and compaction. Further reward comes to those who apply calcium chloride early to hold the moisture which binds the fine cementing materials. This work should be done before these essential binder soils can blow away as dust.

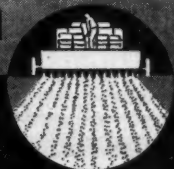
Too little has been said about the use of calcium chloride to prevent evaporation of the roadbed moisture—so essential to maintain compaction. Early road conditioning and early application of calcium chloride will work wonders. Bulletin 29 tells how—it is sent on request.

**CALCIUM CHLORIDE ASSOCIATION**  
4145 Penobscot Bldg., Detroit 26, Mich.

Dust is the cement in your gravel road

Save it with

**CALCIUM CHLORIDE**



When writing, we will appreciate your mentioning PUBLIC WORKS

close the exhaust valve. When this valve is closed, air under pressure rushes into the receiver and forces the contents out the discharge line.

In plant air installations without air compressors, a pressure valve opens when the starting contacts close.

It is claimed that Yeomans Expelsor will pass solids up to the size of the inlet and discharge valves (4" minimum); require no stuffing boxes, no wet well, etc. Bulletin 4402 will be sent upon request to the manufacturer.

### Linn Issues Haftrak and Catruk Bulletin

The Linn Haftrak and the Linn Catruk, those hard duty vehicles for all

types of off-the-highway service, are illustrated and described in a new bulletin just issued by The Linn Manufacturing Corporation, of Morris, New York.

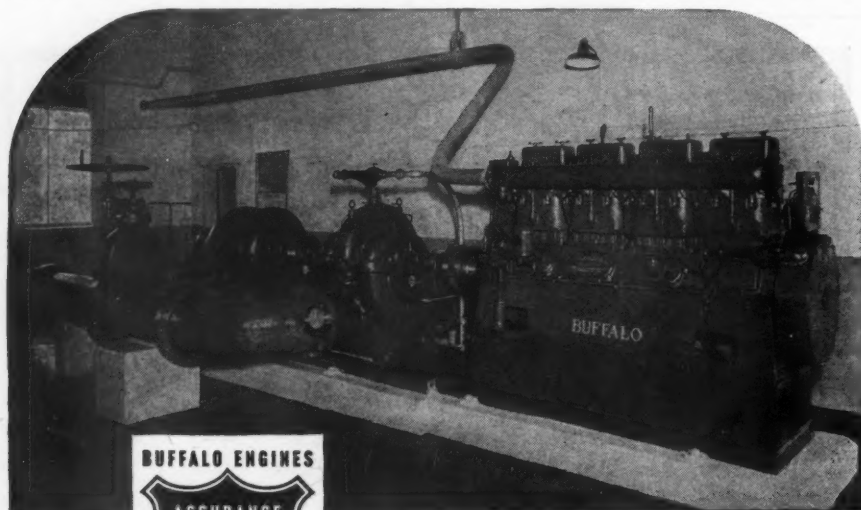
Types shown include Linns with various types of bodies for moving rock; side tipping dump body; Linn pole trailer with log bunks for snow plow mounting. The Catruk models, which are equipped with four wheels and tracks, permit operation as a truck or half-track, according to ground conditions. The rear wheels are hydraulically retractable.

The bulletin, which has been printed in English, Spanish and Portuguese, will be sent free on request to anyone interested in moving loads from 5 to

50 tons, where steep grades, deep mud, snow and ice, sand and rocks make negotiation with wheeled vehicles impractical.



The street fighting in Manila is the business of the seasoned Filipino Guerrilla. This able fighter has set up his ancient heavy caliber machine gun with a bamboo log as a front rest mount, and roped to a Mathews Fire Hydrant, serving as a shield, he can well take command of the street in this area.



BUFFALO ENGINES

ASSURANCE  
of  
PROTECTION

9 MGD DeLaval Pumps installed at the Godwin St. Station, City of Portsmouth, Va. A Buffalo RAB-8 Gasoline Engine is ready as stand-by equipment.

## BUFFALO ENGINES

### Reduce Insurance Costs!

**T**HE value in dollars and cents of a **BUFFALO ENGINE** for emergency power is not set by its F.O.B. price or its cost of installation. It is set by the Fire Underwriters as the sum of the savings from lower premiums for insuring a community or industry that has this protection. Therefore, ownership of a **BUFFALO ENGINE** is always profitable.

**BUFFALO ENGINES** always give assurance of protection and in addition they offer the extra benefits of full rated power, clean, quiet and vibration-free operation and quick starting by manual, remote or full automatic control.

Engineers and others interested are invited to write for specification sheets and data on any type of installation.

### BUFFALO GASOLINE MOTOR COMPANY

DEPT. PW-45

BUFFALO 13, N. Y., U. S. A.

BUFFALO ENGINES — 100 H.P. THROUGH 750 H.P. — IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

BUFFALO ENGINES

ASSURANCE  
of  
PROTECTION

### National Wood Tank Institute

The Institute was formed by manufacturers to promote the uses of wood tanks where practicable.

Samuel Emmons Chaney formerly Field Engineer for the California Redwood Association is executive director with offices in rooms 1329 and 1330, Monadnock Building, Chicago 4, Ill. The Engineers of the Institute will serve as consultants to the trade as well as to the members of the Institute.

### Water & Sewage Works Manufacturers Association Changes Address

Effective March 29th the headquarters office will be located at 170 Broadway, New York 7, N. Y., corner of Maiden Lane, Room 308.

Arthur T. Clark is Secretary-Manager.

### Stacey Brothers to Build Five Million Cubic Foot Gas Holder at Long Beach, California

"The construction of a five million cubic foot telescopic Gas Storage Holder for the City of Long Beach, California, has been awarded to The Stacey Bros. Gas Construction Company, one of the Dresser Industries—and steel erection will start by May 15th."

The five-lift structure will be the world's largest all-welded panel type, water-seal gas holder and will provide reserve storage to meet the high peak loads which have resulted from the increased industrial activity in this area.

The Stacey Brothers vertical panel construction will be used, which permits the use of larger plates, more prefabrication, and greater ease in assembly. Fabrication will be handled in the company's Cincinnati, Ohio and Torrance, California plants.

Priorities for the steel and allocation of the restricted materials were obtained



## CONSULTING ENGINEERS

(Continued from page 68)

### FOSTER D. SNELL, Inc.

An organization of 30 chemists and engineers having laboratories for bacteriology, analyses, research and Physical testing rendering

Every Form of Chemical Service  
Disposal of sanitary and industrial waste. Water supply and purification Consultation

305 Washington St.

Brooklyn, N. Y.

### STANLEY ENGINEERING COMPANY

Consulting Engineers

Airports-Drainage  
Electric Power-Waterworks  
Sewerage-Valuations-Rate Studies  
Municipal Buildings

Central State Bank Bldg. Muscatine, Ia.

### HENRY W. TAYLOR

Consulting Engineer

Post War Planning

11 Park Place

New York 7, N. Y.

from the War Production Board following an investigation as to the essentiality of the project.

## ARMY-NAVY "E" AWARDS



Presenting Army-Navy "E" to General Excavator Co.

### General Excavator Co.

All-out war effort of General Excavator Company workers in Marion, Ohio, climaxed in a colorful Army-Navy "E" flag presentation ceremony. General Excavator earns the "E" for four years' production of critically needed excavating equipment for war construction and war production in the United States and abroad. The ceremony was attended by company executives and employees, and high officials representing the Army and Navy.

At the Army-Navy "E" presentation at the Marion plant, the familiar red, white and blue war production flag was presented to President M. C. McNeil and Shop Committee Chairman John Hill by Lieut. Col. Andrew L. Fabens, U. S. Army, Corps of Engineers, Cincinnati. It was accepted by General

Manager Edgar Barnhart. Employee pins were presented by Lieut. Commr. A. E. Heiser, USNR, naval inspector from Mansfield, and accepted by Mr. Hill.

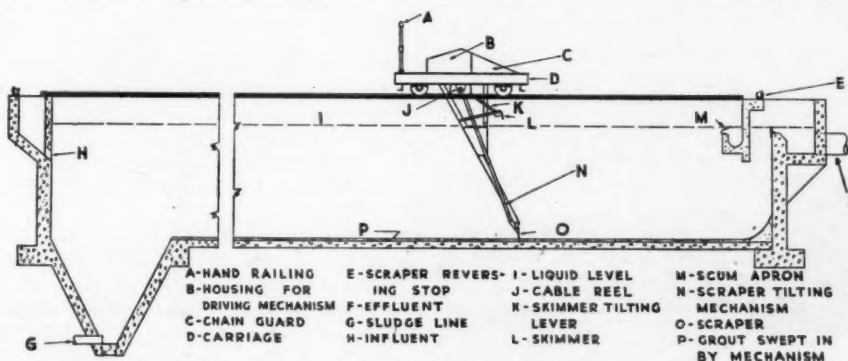
### Wallace & Tiernan Co.

Recognition for outstanding achievement came to the men and women of Wallace & Tiernan Co., Inc., and Wallace & Tiernan Products, Inc., Belleville, New Jersey, for the fifth time on March 10 when they were advised by Under Secretary of War, Robert P. Patterson, that they had been each awarded a fourth white star for their Army-Navy "E" Pennants. This is one

of the few instances where two associated companies in widely separated fields of endeavor each have been five-time winners of the coveted award.

The original award was made to both companies in dual ceremonies in December 1942.

Wallace & Tiernan Co., Inc., with over 30 years of experience in the field of public health, first came into war production in 1940 with the manufacture of field water purification equipment originally developed by them in 1917. The company is now engaged almost entirely in the production of a variety of war goods including all types of water purification equipment in use by Allied Forces.



## RECTANGULAR CLARIFIERS

The Hardinge Rectangular Clarifier consists of a bridge crane which spans the width of the tank and supports the sludge scraper and skimmer. The crane moves back and forth the length of the tank automatically, moving all the settled solids into the sludge hopper at the influent end. The skimmer collects all floating material and delivers it into the scum trough near the effluent end. The entire operation is automatic.

Many Hardinge Rectangular Clarifiers are installed in sewage and water treatment plants. Other installations reclaim waste water from industrial plants.

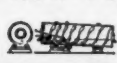
Write for Bulletin 35-B

# HARDINGE

COMPANY, INCORPORATED - YORK, PENNSYLVANIA  
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO



CONICAL MILLS



COUNTER CURRENT CLASSIFIERS



THICKENERS CLARIFIERS



RUGGLES-COLES DRYERS



CONSTANT WEIGHT FEEDERS



TUBE ROD AND BATCH MILLS

When writing, we will appreciate your mentioning PUBLIC WORKS

## Koehring Receives Third Army-Navy Award

The men and women employees of the Koehring Company, Milwaukee, have received for the third time the Army-Navy Production Award for high achievement in the production of war materials. This third citation, received January 13, from Under-Secretary of War Robert P. Patterson, adds a second white star to the Company's "E" Flag as a symbol of continued achievement in producing materials essential to the war effort.

Koehring Company is supplying to the armed forces large quantities of  $\frac{1}{2}$  yard,  $\frac{3}{4}$  yard and  $1\frac{1}{2}$  yard excavators. The company's peace time products include a wide range of excavators, hauling and concrete equipment.

**Shunk**  
Superior Quality  
**BLADES**  
AND CUTTING EDGES

For any make of machine  
Motor Graders, Maintainers, Scrapers, Drags, Bulldozers, Backfillers, Wagon Scrapers, Trail Builders, Trail Blasters, Carryalls, Also—

CUTTING EDGES  
WEARING BOOTS  
BACK SLOPERS  
EXTENSION BLADES  
MOLDBOARDS  
and  
SCARIFIER TEETH

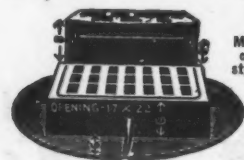
30 years of manufacturing blades has developed for you a special steel, milled through our own rolls and forged at the edges to give that extra wearing quality you need.

All widths, lengths, and thicknesses, **ready to fit your machine.**

Consult your internationally recognized Blade Specialist. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

**Shunk**  
MANUFACTURING COMPANY  
Established 1854  
BUCYRUS, OHIO.

## STREET, SEWER AND WATER CASTINGS



Made from wear-resisting chilled iron in various styles, sizes and weights.  
MANHOLE COVERS  
WATER METER COVERS,  
ADJUSTABLE CURB INLETS

GUTTER CROSSING PLATES  
VALVE AND LAMP HOLE COVERS

Write for Catalog and Prices

**SOUTH BEND FOUNDRY CO.**  
Gray Iron and Semi-Steel Castings  
SOUTH BEND, INDIANA

## Dresser Industries, Inc., Establishes New Up-to-Date Offices in Cleveland, Ohio

General Sales Offices in N. Y.

Administrative offices of Dresser Industries, Inc., formerly of Bradford, Pa., were transferred on March 19th to Terminal Tower, Cleveland. The new offices are planned to provide the latest and most efficient business facilities for the company's personnel.

Dresser Industries, Inc., parent corporation of 13 member companies, has laid out its 5,800 square feet of space in the Terminal Tower to provide modern conference space, reception room, and executive suites, in addition to 14 offices for the accommodation of its staff. Unusual construction and lighting features have been installed to add to the working efficiency of the personnel, to eliminate unnecessary maintenance, and to expedite all headquarters services to member companies.

On March 15th consolidated domestic and export sales offices for the member companies were opened in the Chanin Building, New York City.

Fifteen offices, in addition to a reception room, conference room, and stenographic room, occupy 6,000 square feet of floor space and will also provide New York headquarters for visiting officers of Dresser member companies. Equipped with every modern time-saving device for improved processing and handling of orders, the sales offices of the Dresser member companies will benefit by the combined facilities and central location represented in this new space.

Sales departments of Dresser member companies serving the fields of oil and gas from production to utilization, and represented in the newly opened New York offices, will be the Dresser Manufacturing Division, Bryant Heater Co., Clark Bros. Co., Inc., Pacific Pumps, Inc., International Derrick & Equipment Co., Roots-Connersville Blower Corp., Stacey Bros. Gas Construction Co.

## A New Chain Belt Distributor

The Chain Belt Company announces the appointment of M. D. Moody, A. C. L. Warehouse No. 2, Riverside Viaduct, Jacksonville, Florida, as distributor of Rex Construction Machinery in the Jacksonville, Florida, area.

His son, Mr. M. D. Moody, Jr., will be associated with him.

Besides handling the complete line of Rex Construction Machinery, including pavers, mixers, pumps, Pumpcretes (the pump that pumps concrete), Moody will carry a large stock of Rex parts in line with his policy of giving the best service to his customers.

## Dorr Advances McArthur

C. K. McArthur has been promoted by The Dorr Company to Manager of Sales covering United States, Mexico, Canada, Newfoundland and Alaska. For the past two years Mr. McArthur

has been Manager of the Company's Metallurgical Division. His headquarters continue to be in New York.

Mr. McArthur joined The Dorr Company as a sales engineer in 1926, and has since broadened a metallurgical background, then already extensive, through engineering operations for Dorr in the United States, Canada, South America and Mexico. This broad experience and background makes him well qualified for his new responsibility.

## Griffin Branch Office in Jacksonville Moves

The Griffin Engineering Corporation, southern branch of the Griffin Wellpoint Corporation, New York City, has moved recently to a new location at 2016 East Adams Street, Jacksonville 2, Fla. Neill N. Payne is Manager.

Among the services which are rendered at this branch are the rental and sale of Griffin Wellpoint Systems, centrifugal pumps  $1\frac{1}{2}$  to 10 inches in size, Griffin Portable Engine-Driven Generators, and Portable Floodlighting Equipment.

## Hoffmann Reappointed Minnesota Commissioner of Highways

M. J. Hoffmann, commissioner of highways of Minnesota, has been reappointed by Governor Edward J. Thye for a four year term ending April 20, 1949. The appointment has been confirmed by the State Senate.

Except for 19 months service with army engineers in World War I, Mr. Hoffmann has been connected with the Minnesota Department of Highways since January, 1914, serving successively as bridge draftsman and designer, division engineer, assistant maintenance engineer, and chief bridge engineer. He was first appointed commissioner of highways January 4, 1939.

## McWhorter Appointed Division Engineer

B. P. McWhorter, principal highway engineer of the Public Roads Administration of the Federal Works Agency at Richmond, Va., has been made division engineer in charge of the Public Roads division office at Montgomery, Ala.

Mr. McWhorter will direct Federal highway activity in Alabama, Georgia, Florida, Mississippi and Tennessee, with headquarters at Montgomery. He succeeds Charles D. Snead, who died February 13.

## Asphalt Institute Elects

At their annual meeting the Board of Directors of The Asphalt Institute, representing the major part of the petroleum asphalt production industry of the United States and Canada, elected H. B. Pullar of Berry Asphalt Company, Chairman of the Executive Committee, with Ole Berg, Jr., Union Oil Company of California; C. E.